IRENA
International Renewable Energy Agency

CHAPTER **THREE**

Harnessing the Potential of Corporate Sourcing of Renewable Electricity

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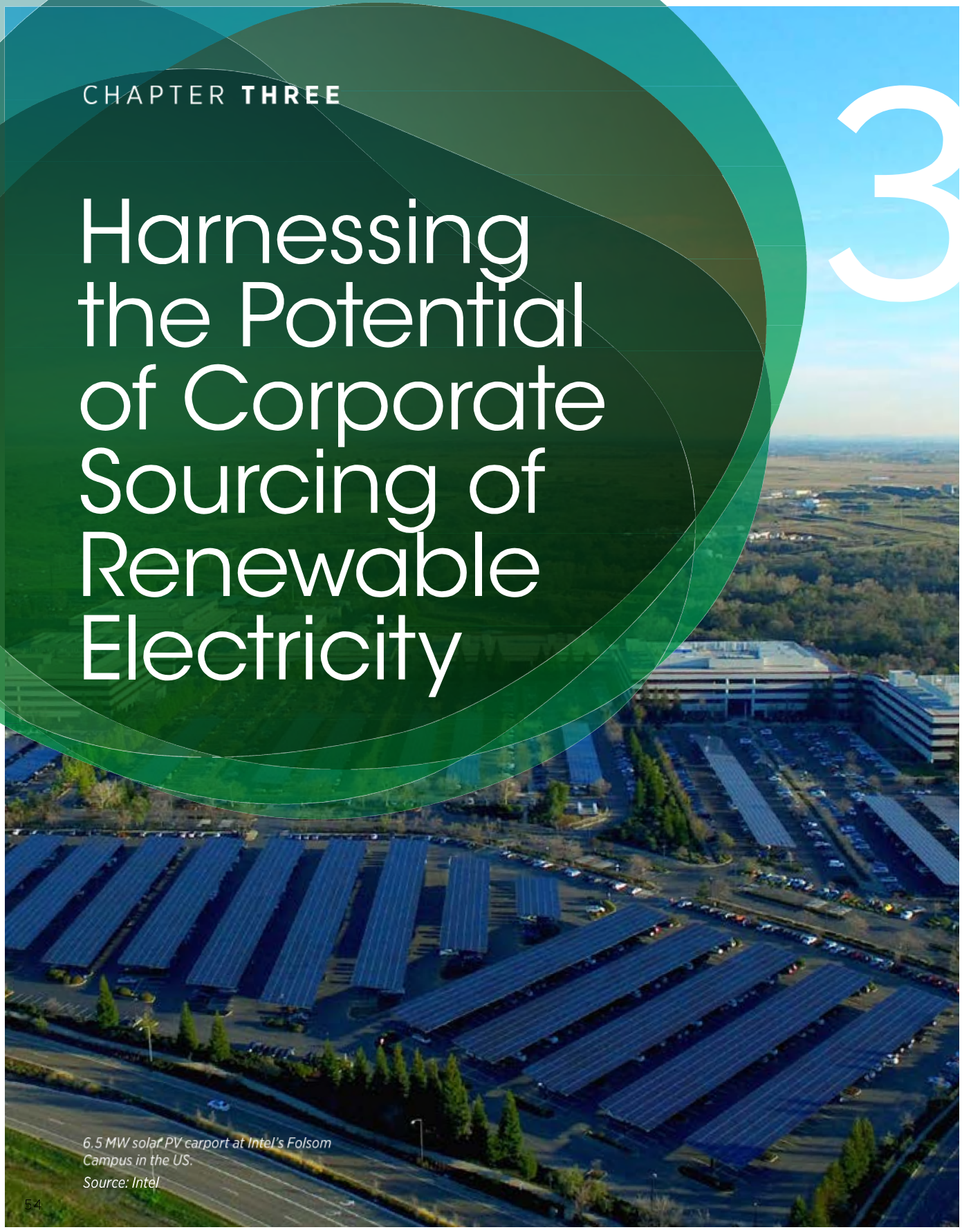


6.5 MW solar PV carport at Intel's Folsom Campus in the US.
Source: Intel

Renewable energy, together with energy efficiency, is an important driver for accelerating the global energy transformation.

Given that two-thirds of CO_2 emissions come from the energy sector, renewable energy can clearly play a role, but it will have to be scaled up six times its current growth rates to meet the objectives of the Paris Agreement (IRENA, 2018a). It is here that corporate sourcing of renewable energy will be critical.

Companies can significantly contribute to the energy transformation if they increase their renewable energy commitments and shift investments so that additional renewable electricity capacity is built. Corporate sourcing is still in its infancy owing to its perceived complexity and the technical and financial risks associated with changing existing patterns of energy consumption. Furthermore, many countries still lack the appropriate policy and regulatory frameworks to permit broad corporate sourcing of renewables. Hence the untapped potential for corporate participation in the renewable energy space is enormous.

Companies can significantly contribute to the energy transformation if they increase commitments and shift to more direct investments

298 MW Thunder Ranch wind project by Enel Green Power of which Anheuser-Busch purchases a portion of the generated electricity through a corporate PPA.

Source: Enel Green Power

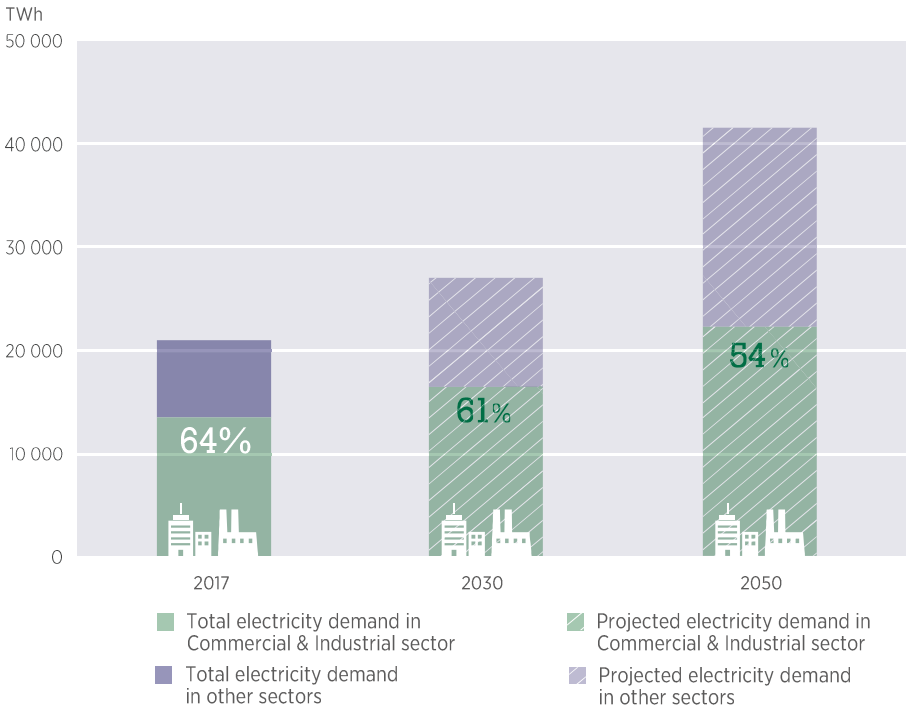
3.1. Corporate market potential and contribution to the energy transformation

The Commercial & Industrial sector consumed almost two-thirds of global electricity in 2016 (see Figure 3.1). According to analysis by the International Renewable Energy Agency (IRENA), that share will decrease to 61% by 2030 and to 54% by 2050 with improved energy efficiency and the on-going electrification of sectors such as transport. Nevertheless, absolute demand in the Commercial & Industrial sector will grow from 13 500 TWh in 2016 to 22 000 TWh by 2050.

Electricity is used in the Commercial & Industrial sector for a wide range of purposes depending on a country's economic activity and level of technological development. Major uses include the electricity needed to process, produce or assemble goods in electricity-intensive industries such as manufacturing, mining, agriculture and construction; the operation of industrial motors and machinery; and servicing heating and cooling, lighting, ventilation and air conditioning systems for their operations.

IRENA analysis projects a global energy transformation that delivers on the climate objectives set out in the Paris Agreement, a transformation that is technically feasible and economically beneficial. In it, the share of renewables in total electricity use would increase from 20% in 2016 to **at least 85% by 2050** (IRENA, 2018a). For the Commercial & Industrial sector, attaining this share would translate into 10 400 TWh and 19 000 TWh of renewable electricity demand by 2030 and 2050, respectively (adapted from IRENA, 2018a; IRENA and IEA, 2017).

Figure 3.1. Volume and share of the Commercial & Industrial sector in global electricity demand



In addition to existing and planned public incentive schemes such as auctions, feed-in tariffs and other policy mechanisms, corporations can significantly contribute to this needed acceleration of renewable energy deployment through active and more direct procurement of renewable electricity.

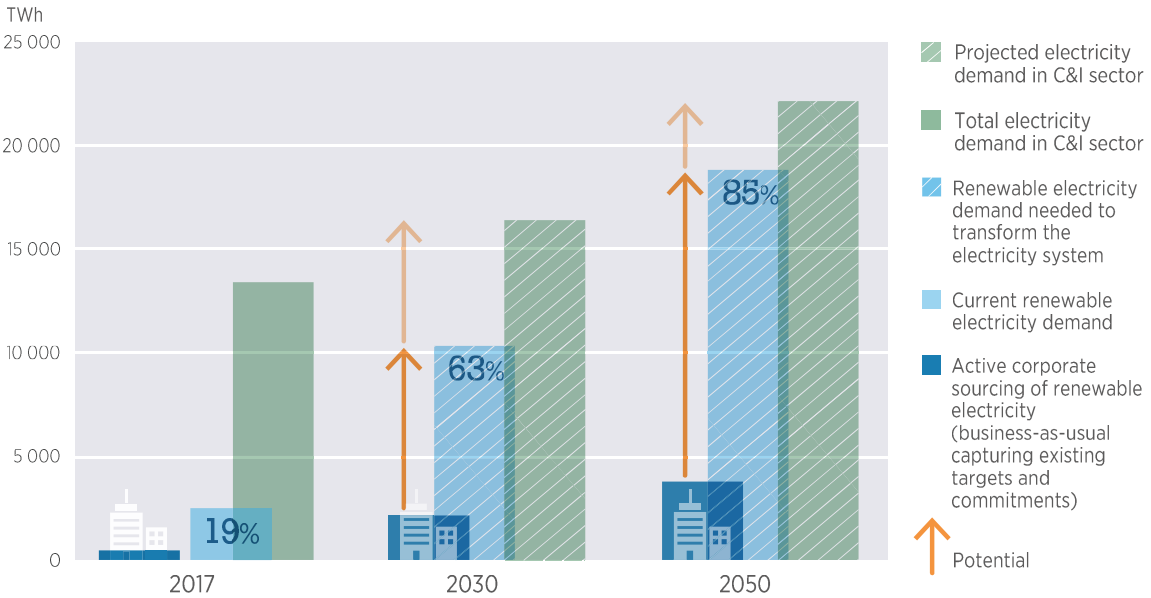
Taking into account current and planned corporate sourcing of renewable electricity on the global level, active sourcing is estimated to reach 2 150 TWh by 2030 and 3 800 TWh by 2050. This includes existing company targets, commitments and ambitions – in other words, it presents a business-as-usual perspective. Corresponding to 20% of the total renewable electricity demand in the Commercial & Industrial sector in 2050, it is far from the 85% (19 000 TWh) that would be required to meet the objectives of the Paris Agreement. Figure 3.2 outlines active corporate renewable electricity procurement to 2050 and shows the potential of companies to drive the global energy transformation.

If corporations continue to raise their ambitions with support from the right enabling frameworks, the potential for corporate sourcing is vast; its contribution to the energy transformation could reach levels of up to 100% of the total renewable electricity demand (22 000 TWh) in the Commercial & Industrial sector. As observed in Chapter 1, more than 111 companies were already obtaining at least 85% of their electricity from renewable sources at the end of 2017, demonstrating that high ambitions are feasible. But to drive the energy transformation, **all companies will have to strive for a higher share of direct renewable electricity in their energy consumption.**

19 000 TWh

of renewable electricity needed to transform the Commercial & Industrial sector

Figure 3.2. Corporate sourcing of renewable electricity in the Commercial & Industrial sector



Note: The figure compares current and future active corporate sourcing of renewable electricity based on existing targets and commitments with the amount of renewable electricity needed to transform the global electricity system and have a chance to reach the climate goals set out in the Paris Agreement.

3.2 Reaching the potential: The corporate perspective

No single approach dominates corporate sourcing of renewable electricity. Companies pursue different energy strategies, reflecting their motivations, needs and constraints in operations in diverse geographic and regulatory settings. To date, reaching environmental targets and demonstrating corporate responsibility have been the most important drivers behind corporate sourcing of renewables. As renewables become even more cost-competitive in the energy marketplace, energy management and economic and financial drivers, such as cost savings, long-term price stability and security of supply, will likely increase in importance in the coming years (see Box 3.2).

Nevertheless, it must be remembered that energy is not the core business of most companies, but rather a running operational cost to be dealt with by the procurement and finance departments. Acquiring alternative energy supplies, including renewable electricity, can be an unfamiliar process for a company accustomed to relying on conventional wholesale or retail electricity. Companies may perceive renewable energy as less cost-competitive and more risky than conventional sources.

Once internal support has been secured and renewable energy has become part of a company's procurement strategy, identifying the right sourcing model adds another level of complexity. The rapidly maturing corporate sourcing market provides several options that come with various levels of ownership, financial participation and additionality (defined in Box 3.1). Many companies rely on external consultancies to aid in the process, which translates into an additional cost. Other sourcing challenges may include regulatory barriers in many markets as well as artificially low wholesale and retail prices of conventionally produced electricity, which make it less likely that renewable electricity will make economic sense for a company.

Companies have innovated in procuring renewable electricity but have not yet reached full speed or potential.

Although the purchase of unbundled EACs still represents the predominant model of sourcing renewable electricity outside the Materials sector, recent years have seen a marked increase in corporate investment in new, innovative and more direct procurement models that result in more renewable energy capacity being added to the grid. An important accelerator of this trend has been the declining costs of renewables in comparison to conventional energy sources.

Companies wanting to engage in procurement of renewable electricity or existing buyers seeking to accelerate or diversify their purchases may want to consider the recommendations outlined in the following pages.

Recommendations

Adopt a target and renewable energy sourcing strategy deliberating on ambition and types of claims.

Committing to a renewable electricity target is an important first step and tool to measure the corporation's performance against a baseline year. Setting a renewable energy target also provides a clear signal internally as well as to shareholders and potential investors of the company's ambitions to capture the benefits associated with renewable electricity sourcing, including the potential to hedge against volatility. A strategy should weigh options for the company to meet its energy needs through renewables as well as the type of public claims that the corporation wishes to make about its use of or support for renewable energy. Most companies sourcing higher shares of renewable electricity, whether in one or several locations, use a mix of procurement options with various capacity to contribute to the energy transformation. In most companies, top executives drive renewable energy procurement and are setting the strategic direction when it comes to targets, policies, and projects (CEF-WWF, 2016).

Consider renewable energy sourcing options that carry a higher level of additionality.

Renewable sourcing choices that lead to additional investment and bring additional renewable capacity to the grid are crucial to accelerate the energy transformation; they also help companies make more credible claims about their sourcing of renewable energy. For more information on how companies can exert greater impact in transforming the energy systems, see Box 3.1. In recent years, various guidelines and reporting standards have been developed to provide specific guidance on how corporations can use their purchasing power to raise investment in renewable energy capacity and underpin renewable usage claims – among them, guidelines by the Greenhouse Gas Protocol and RE100/CDP.

Source: Ørsted

Report transparently on renewable electricity consumption claims.

Companies can contribute to further raising the profile of corporate sourcing of renewable electricity by improving self-reporting processes following best practice available. Guidelines for credible claims and reporting already exist, including the Greenhouse Gas Protocol and RE100's Technical Criteria and Making Credible Claims. As corporate sourcing evolves and local specifications increase, these guidelines will need to be strengthened and further adapted. Companies can use the above-mentioned guidelines already when reporting claims through their corporate social responsibility report or to investors through various disclosing programmes. To further strengthen the ability of companies to report, governments should facilitate and encourage these systems as discussed in the next section.

Drive corporate procurement innovation and global change management across private and public sectors.

Companies are increasingly turning to renewable electricity to sustain their energy supply, as innovative procurement options emerge. This, in return, creates important spill-over effects among peers and competitors. It also encourages supply chains, through a top-down approach, to engage in renewable electricity purchasing. By working with governments and utilities, and explaining corporate procurement requirements, companies have influenced and must continue to inform supporting policies and enabling frameworks needed to scale up renewable electricity sourcing.

Box 3.1. Additionality

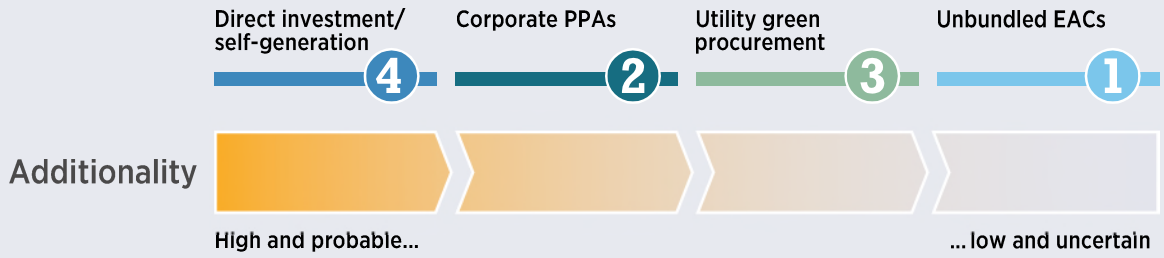
Additionality refers to the net incremental capacity added to the energy system as a direct result of corporate sourcing, beyond what would have occurred in its absence. While direct investments in self-generation in most cases contribute to additional renewable energy capacity being deployed (may not qualify as additional in some markets where the system has benefitted from public support), the additionality of other corporate sourcing options and models may be difficult to measure and is not a given.

As corporate sourcing markets mature, the aspect of additionality is receiving increased attention from corporations.

The illustration below gives an indication of the level of additionality associated with different sourcing models. However, this is just an indication and various sourcing models can present very different levels of additionality depending on their design and market.

Defining general rules about a certain sourcing model's ability to generate additional capacity to the energy system is challenging and complex, often depending greatly on the local context. For the purpose of this report and the analysis of companies reporting data, no evaluation has been made of the sourcing models the companies have used to reach a certain share or volume of renewable electricity (see methodology in Annex 1).

Figure 3.3. Corporate sourcing options, by likely degree of additionality



In general, four different paths may be considered by companies planning to source renewables in the coming years:

Path 1: The corporation sources electricity derived from new renewable energy installations not benefitting from existing policy schemes and that may therefore not have been built or financed without the corporate engagement. Here, corporations act as an enabler of additional renewable energy generation by becoming the project sponsor as they drive implementation and financing. This sourcing approach can be pursued through certain corporate PPA models or through direct investment in self-generation.

Path 2: The corporation sources electricity from an existing installation to ensure continued operation after the system runs out of public support (public incentive schemes for renewable energy have an average duration of 10 to 20 years, while the lifetime of a system is several years longer). This sourcing approach can likewise be pursued through a corporate PPA or some sort of green tariff programme.

Path 3: The corporation sources electricity from an existing project already built with public support, claiming the related bundled certificates. This sourcing approach can be pursued through a utility's renewable energy premium product or certain types of PPAs. The additionality of such sourcing may not be as high as for paths 1 and 2.

Path 4: The corporation sources electricity through the purchase of unbundled EACs. Although this option has the advantage of offering flexibility, simplicity and lower operational risks, the low average prices of unbundled EACs cast doubt on the extent to which trading them will help to support existing or create new additional capacity.

Current market trends indicate that paths 3 and 4 are still the most common sourcing practices but that corporate willingness to pursue paths 1 and 2 is increasing. In order to reach the potential outlined at the beginning of this chapter, greater use of the more ambitious paths will be essential.

Shift

in renewable electricity sourcing has been seen towards more direct procurement models

Box 3.2. Corporate sourcing drivers

From the corporate surveys analysed for this report, the main drivers for corporate procurement can be grouped into four categories. Similarly, these drivers were also identified by RE100 in their latest Progress Report (RE100, 2018).

» **Environmental and sustainability drivers** were ranked as a top priority. These include responding to climate change concerns and managing environmental objectives. For companies that do not have a renewable electricity target, targets for reducing greenhouse gas emissions emerged as the key driver for procuring renewables.

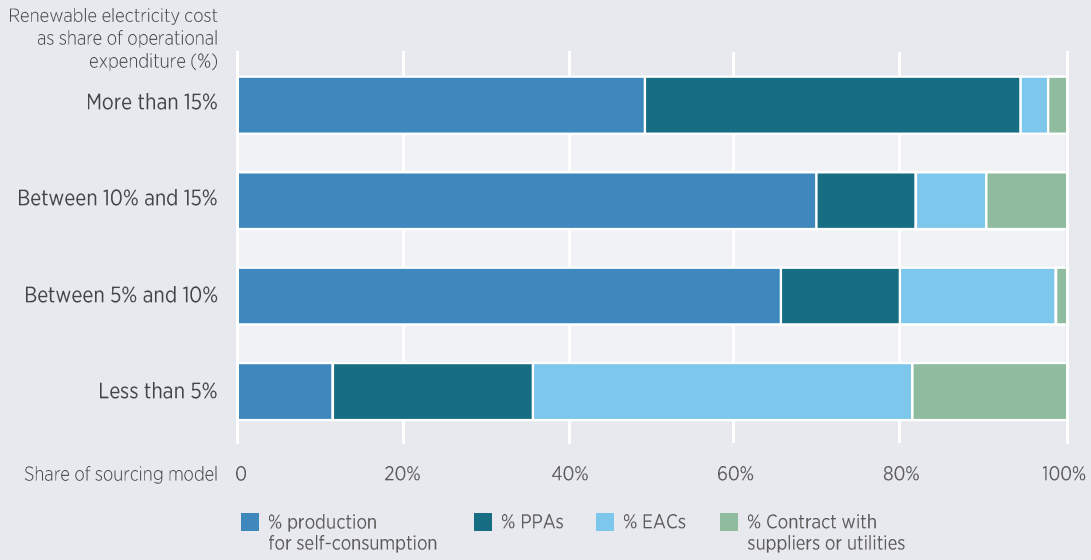
» **Corporate social responsibility and reputational drivers** were the second-highest priority. These relate to mitigating reputational risks, including answering to customers and shareholders who seek more sustainable operations from companies or, in the case of shareholders, more favourable public opinion.

» Classified third were **economic and financial drivers** such as reducing energy costs, positioning the company for better long-term price stability and hedging against potential price volatility. Economic and financial drivers will likely increase in importance as renewables become even more cost-competitive. This is particularly important for companies that have placed less emphasis in the past on environmental and sustainability priorities and that will be incentivised to turn to renewables for purely financial and economic reasons.

» For **energy management drivers**, ranked last, the main motivation is twofold. First, companies want to ensure the security of future energy supply. Second, they seek to diversify their energy supply as a hedge against volatility in global energy markets.

Survey results show that companies in which energy accounts for a small share of total operational costs (less than 5%), the use of unbundled EACs is the most common method of sourcing renewable electricity. In contrast, for companies in which energy represents a more significant share of operational expenditure (more than 15%), self-generation and PPAs are the preferred approaches. This is especially true in the Materials sector. A possible explanation is the fact that the procurement of EACs represents an actual cost to companies rather than a direct financial benefit. Conversely, generating renewable electricity for the company's own consumption or entering into a physical PPA allows companies to manage their energy supply and to a larger extent associated costs.

Figure 3.4. Renewable electricity sourcing by share of total corporate spending



3.3. Enabling frameworks: The policy perspective

In addition to a company's internal capacity and motivation to source renewables as outlined in the previous section, the possibility of implementing ambitious targets and strategies depends greatly on the markets in which the company operates, as well as the policy frameworks governing those markets. As with any form of renewable energy deployment, corporate sourcing of renewables can realise its full potential only when it has government backing through the establishment of long-term, stable and predictable policy frameworks. More importantly, the right policy framework can support sourcing models that trigger additional renewable energy generation. However, much of the strength and potential of corporate sourcing lies in the fact that relatively few and low-cost policy adjustments can provoke a quick market pick-up both in vertically integrated and liberalised energy markets.

For governments, the reasons for encouraging and facilitating corporate sourcing include the opportunity to attract additional investment in renewables, which in turn can support compliance with national and international climate objectives. In addition to meeting climate and energy targets, it can further support a government's broader socio-economic objectives, including job creation and economic growth. The latter has been the main driver for countries and governments using renewable energy and low electricity taxes to attract investments by large energy-intensive data-centres (Quartz, 2017).

While some governments have been quick to acknowledge the corporate sector's growing demand for renewable energy and the associated opportunities, findings from the 2017 IRENA corporate sourcing country survey indicate that a large majority of governments do not include or specifically address corporate sourcing of renewables in their energy strategies (IRENA, 2017). In many countries, policy-makers still lack systemic knowledge about how to integrate corporate players into renewable energy markets and at what level of participation.

The following paragraphs outline the types of policy and regulatory support that can unlock the potential of corporate sourcing to propel the energy transformation. Key examples of such policies and enabling frameworks are summarised in Table 3.1 and presented below in the form of recommendations. In addition to policies enabling voluntary sourcing of renewables, some countries have introduced renewable electricity compliance quotas for large electricity users however these will not be explored in this report.

Support a credible and transparent system for certification and tracking of renewable energy attributes.

Independently of the corporate sourcing model used, a credible claim of use of renewable electricity depends on the availability and effective tracking of EACs. An EAC scheme guarantees that a specific amount of energy having certain (renewable) attributes originates from a certain source. It further verifies exclusive ownership of those attributes by the customer making the claim – in this case the corporation. Many countries with established EACs markets have two trading schemes: one for compliance markets, where utilities and energy suppliers trade certificates to comply with quota obligations; and one for its voluntary market (IRENA, IEA, REN21, 2018). The latter is crucial for companies wanting to source renewable electricity. In markets without certificate tracking systems, it has been proven to be more difficult for corporations to substantiate their claims of renewable energy usage, which in turn discourages further corporate sourcing (Powers, 2016) (Bird et al., 2017).

IRENA's country survey indicates that a large majority of governments do not include corporate sourcing of renewables in their energy strategies

Box 3.3. Green electricity consumer labels

In a growing number of countries, environmental non-profit organisations have launched voluntary consumer labels for renewable energy as a way to strengthen transparency. These labels certify that a green energy product (e.g., unbundled EACs or utility green premium products) fulfils certain defined environmental and sustainability quality criteria as well as ensures that the energy is properly tracked and not double counted. While few labels certify additionality (see Box 3.2), some voluntary certificate programmes or labels dedicate a portion of revenue from the programme as "incremental funding" for new renewable energy projects.

Well-known examples of local energy consumer labels are Bra Miljöval in Sweden, Grüner Strom in Germany, NatureMade in Switzerland and Svanemærket/EU-Blomsten in Denmark. Other labels, such as EKOenergy from Europe and the American Green-e, are increasingly active on the international market (in particular in Asia and in Latin America).

The Greenhouse Gas Protocol recommends that, where possible, corporations purchase certified green electricity products. Many local and regional certification programmes already make this possible. However, in many parts of the world companies still lack access to these schemes. An added complexity is that companies with global operations must sustain their certification efforts across different programmes, making them more time-consuming and challenging. An international and recognised voluntary label, backed by governments, would facilitate corporate access, ensure environmental and sustainability requirements, and improve transparency around additionality.

Responsibility for issuing, tracking and verifying EACs should fall to an independent issuing body – generally a government agency or private actor, depending on the market. Tracking can be done using electronic systems or contracts. If contracts are used, the attribute transaction is detailed in a legally enforceable contract between the generator and end user. In this case, claims are based on the ownership of the attributes specified in the contract. Electronic EAC tracking systems can be preferable, to encourage robust markets, and may provide greater transparency and accountability if implemented properly. Certificates are tracked when transferred from generators to end-use customers and until they are retired or cancelled by an end-user making a claim (RE100, 2016). Often, tracking systems provide verification of the renewable generation data from the project owner to ensure accuracy. In general, the effectiveness of tradable EACs depends on some sort of parallel compliance market (e.g., for large developers/utilities) with adequate enforcement (IRENA, IEA, REN21, 2018).

As demonstrated in Chapter 2, the global diversity of EAC schemes provides options in various regions for companies looking to procure renewable energy. An area of concern, however, is a general lack of standardisation, eligibility and utilisation between EAC systems, particularly where multiple systems exist in a single jurisdiction. With multiple tracking systems, it becomes more challenging to ensure that double counting does not occur.

Consider an energy market structure that allows for direct trade between companies of all sizes and renewable energy developers – such as through PPAs.

At the end of 2017, most corporate PPAs were being signed in less-regulated markets, allowing for bilateral contracts directly between a large corporate buyer of electricity and a renewable energy developer. The global corporate PPA market will likely grow as more and more governments shift away from early support schemes including feed-in tariffs and administratively set premiums. Henceforth, developers will be looking for alternative off-takers – and having a PPA with a large creditworthy company presents an attractive alternative.

While allowing for third-party sales is a prerequisite for bilateral contracts between companies and developers, additional enabling frameworks may help stimulate corporate PPAs, including electricity retail rates, which closely track wholesale rates. This is particularly important for so-called virtual PPA transactions, where contracts and payments are determined on the basis of the market reference price and then settled between the corporate buyer and the developer.

Even though corporate PPAs thrive in less-regulated markets, there are still a number of examples of vertically integrated markets lacking the possibility of third-party sales but where corporate PPAs have been signed between large industrial or corporate players and the utility. In such cases, the utility must be willing to engage directly in this type of long-term transaction or be mandated to do so.

Most corporate PPA deals are large-scale and therefore built off site from a company's premises. This means that corporate PPAs benefit from open access or at least clearly defined transmission policies with priority access for renewables. In addition to priority access for renewables, some markets offer lower transmission fees for renewable generators (Heeter et al., 2016). Also, creating larger and more integrated electricity grids can provide a greater market from which companies can source, thus potentially lowering costs (Bird et al. 2017). This will also enable smaller companies to enter the PPA space and, coupled with providing easier access to available projects and less complex contractual arrangements, create additional market players.

A PPA in itself will not be enough for a company to make a credible renewable electricity claim, as companies must retain any attribute certificates associated with the electricity production to be sure that the same electricity is not claimed by someone else. The creation or strengthening of a robust EAC system can support this.

Work with utilities or electric suppliers to provide green corporate procurement options.

The restructuring of electricity markets, in which corporations are provided with access to alternative suppliers, allows for greater flexibility in procurement and more options for companies. Therefore, retail access and the tailoring of retail products to specific consumer demand is a key enabler for increased corporate procurement by all sizes of companies.

In some markets, utilities may be required to offer renewable energy options. Otherwise, the presence of green electricity programmes depends on the willingness of the utility to implement a programme – and the quality of such offerings can vary. To address quality concerns, policy-makers and regulators should support the use of established standards and consumer labels.

More complex utility offerings, such as long-term green tariffs, are often negotiated directly between large energy consumers and the utility. Because this may not be possible to the same extent for SMEs, utilities should make sure to tailor their offerings to smaller players as well. Regulators can play a role in ensuring that these offerings are fair and equitable. Key issues may relate to the ability of the corporate off-takers to retain some of the potential cost savings or the value of the hedge against future electricity price increases (WRI, 2014).

Already light policy adjustments can enable a rapid market pick-up of corporate sourcing of renewables

Empower companies to engage in direct investment for self-generation.

Encouraging direct investment for self-generation will play an important role in accelerating the energy transformation. Key policies that enable this development include clear and efficient interconnection and permitting practices, and, in the case of off site projects, the ability to transport electricity to the site where it is to be used.

Smaller scale self-generation, i.e., on site or close to the point of use, can be supported through net metering or net billing, which offers owners of renewable energy systems the possibility of "storing" electricity by feeding it into the grid at a rate of compensation. Conditions surrounding the rate of compensation of the exported electricity can have a significant impact on project economics (Zinaman et al., 2017). Well-designed net metering and net billing schemes may allow for significant cost savings for the company engaged in self-generation. In addition to the design of the policy scheme, the overall tariff structure and the presence of demand charges influence the economics of projects used for self-generation.

For off site projects, transporting electricity to the site of the end user can be a challenge. If electricity has to be transferred across utility service areas through its transmission and distribution system, grid transport charges may apply. These costs vary substantially across jurisdictions and may significantly affect the economics of off site projects. The ability to transport electricity may also be limited; it is more commonly available in liberalised markets.

In addition, interconnection costs and the time needed to connect the system to the grid can have a significant impact on project economics, and uncertainty about interconnection costs can be a hindrance to development. In some jurisdictions, policies have been devised to increase processing times, transparency and cost certainty for commercial-scale projects (Bird et al., 2018). Specifically, jurisdictions may have timeline requirements for utilities and pre-application reports designed to provide a better understanding of grid conditions, and hence of interconnection costs, at the site (Bird et al., 2018).

Source: Intel

Table 3.1. Overview of policy measures that support various corporate sourcing models

Corporate sourcing model	Policy measures	Examples of countries using these policies on a national or sub-national level
1 **Unbundled energy attribute certificates (EACs)**	• Support a system of EACs. • Provide transparent and credible system for renewable EACs and consider the development or use of an electronic system for tracking and trading. • Ensure that ownership of EACs under various sourcing models or other programmes is clear. • Support quality certification of EACs, e.g., consumer labels.	Guarantees of origin in Europe; renewable energy certificates in Australia, China, India, Mexico and United States
2 **Corporate power purchase agreements (PPAs)**	• Allow third-party sales directly between corporate buyers and independent power producers. • Offer clear and transparent grid-access rules and electricity transport arrangements that permit both on site and off site power purchase agreements. • Support a system of EACs.	Argentina, Brazil, Chile, Mexico, Netherlands, Norway, Sweden, United Kingdom and United States
3 **Renewable energy offerings from utilities or electric suppliers**	• Create market-based energy pricing/tariffs. • Encourage tailored long-term renewable energy contracts for large-scale corporations (e.g., green tariff programmes). • Facilitate mechanisms to increase retail competition which can result in a greater number of options for end-use customers (often at competitive prices). • Support a system of EACs.	Netherlands and United States
4 **Direct investment in production for self-consumption**	• Establish efficient interconnection and permitting practices. • Provide a clear and stable mechanism for on-site and off-site systems to feed excess electricity to the grid (e.g., a net metering scheme) – preferably with priority dispatch for renewable energy. Evaluate potential system size limitations. • Enable mechanism that allows for the transport of electricity from off site generation to the place of consumption. • Support a system of EACs.	China, India, Japan and United Kingdom

Fostering Corporate Sourcing of Renewables: Conclusions

4

Source: DHL Germany

Delivering the energy transformation will require fundamental shifts in policies, investments, planning, processes, attitudes and behaviours. Not only governments will need to take the lead in achieving this shift. Corporates can become an important driver in accelerating the energy transformation if they embrace a shared responsibility in decarbonising the economy. By shifting investments towards more direct sourcing models, companies could not just secure the cost of their power source and hedge against price escalation and price volatility, they could help advance necessary additional renewable energy deployment and enable associated socio-economic benefits such as gross domestic product growth, job creation and welfare gains.

Corporate sourcing of renewables has the potential to drive the energy transformation and increase the chances of achieving global climate targets.

Significantly accelerating corporate renewable electricity consumption by 2050 is an achievable goal, as demonstrated by the ambition and commitments of the more than 2 400 companies analysed in this report. Nearly a fifth of the companies that report renewable electricity consumption already source at least half of their electricity from renewable sources. Of these, 111 are already procuring between 85% and 100% of their electricity from renewable sources. However, to reach global climate targets, more companies will need to get on board. A large majority of the companies (70%) analysed still show levels of renewable electricity consumption below 25%. To achieve the energy transformation of 85% renewables in the power system, companies will have to take action now.

Companies can contribute to the needed scale-up in investment and provide capital needed to finance the energy transformation.

The energy transformation will require significant investments over a relatively short time. Renewable energy deployment must grow six-fold to meet the objectives of the Paris Agreement (IRENA, 2018a). Companies can help mobilise part of the additional investment stream of USD 22.3 trillion needed to fill the existing financing gap in renewables. In the power sector alone, companies could unlock significant investment by 2050, provided they accelerate renewable electricity commitments and shift towards more direct procurement models.

Corporate innovation in renewable energy sourcing needs to be encouraged and incentivised through enabling frameworks.

Corporate sourcing of renewable electricity takes place in over 70 countries. To stimulate further corporate innovation in sourcing, new relationships and closer partnerships must be developed between the private and public sectors. Governments will need to facilitate the opening of new sectors and markets, and promote innovation in renewable energy technology. Companies, too, will have to innovate in the process of adapting to an increasingly decarbonised global energy mix.

In recent years more and more companies have invested in innovative procurement as they have pursued their goals of environmental and corporate social responsibility in a manner compatible with their economic, financial and energy management goals. Today companies are turning increasingly to direct investments in on site and off site generation from renewable sources to supply their operations. As these trends pick up speed, the market will see more companies seeking to contribute to the building of new renewable energy projects instead of supporting projects that have already been commissioned. Utilities and governments will play a crucial role by establishing supportive enabling frameworks.

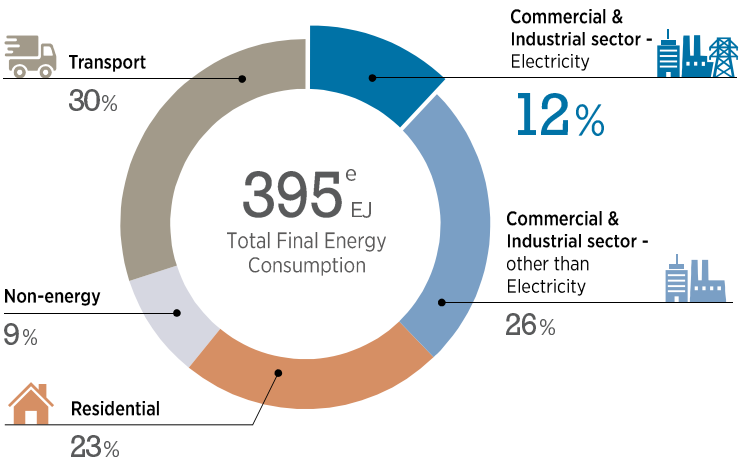
Corporate sourcing of renewables must grow beyond the power sector.

Corporate commitments to the use of renewable energy must not stop at electricity generation but focus on all end-uses such as transport, heating and cooling. Companies' carbon footprints extend well beyond their electricity consumption and their renewable energy efforts should reflect this.

The renewable energy potential that companies can unlock in other end-uses is vast (see Figure 4.1). This report covers only a fraction (12%) of that potential. More research will be required to fully understand and develop corporate sourcing of renewables in other areas. Companies are also uniquely positioned to create successful synergies between renewable energy and energy efficiency, leading by example into the decarbonisation age.

Through transparent reporting, companies can improve identifying barriers by sourcing model and by jurisdiction, thus enabling supportive policy-making and more effective regulatory frameworks for corporate sourcing of renewable energy in all end-uses.

Figure 4.1. Global total final energy consumption in 2016



Only through combined efforts and working hand in hand, the private and public sector will be able to develop the full corporate sourcing of renewables potential needed to accelerate the energy transformation.

Note: e = estimate

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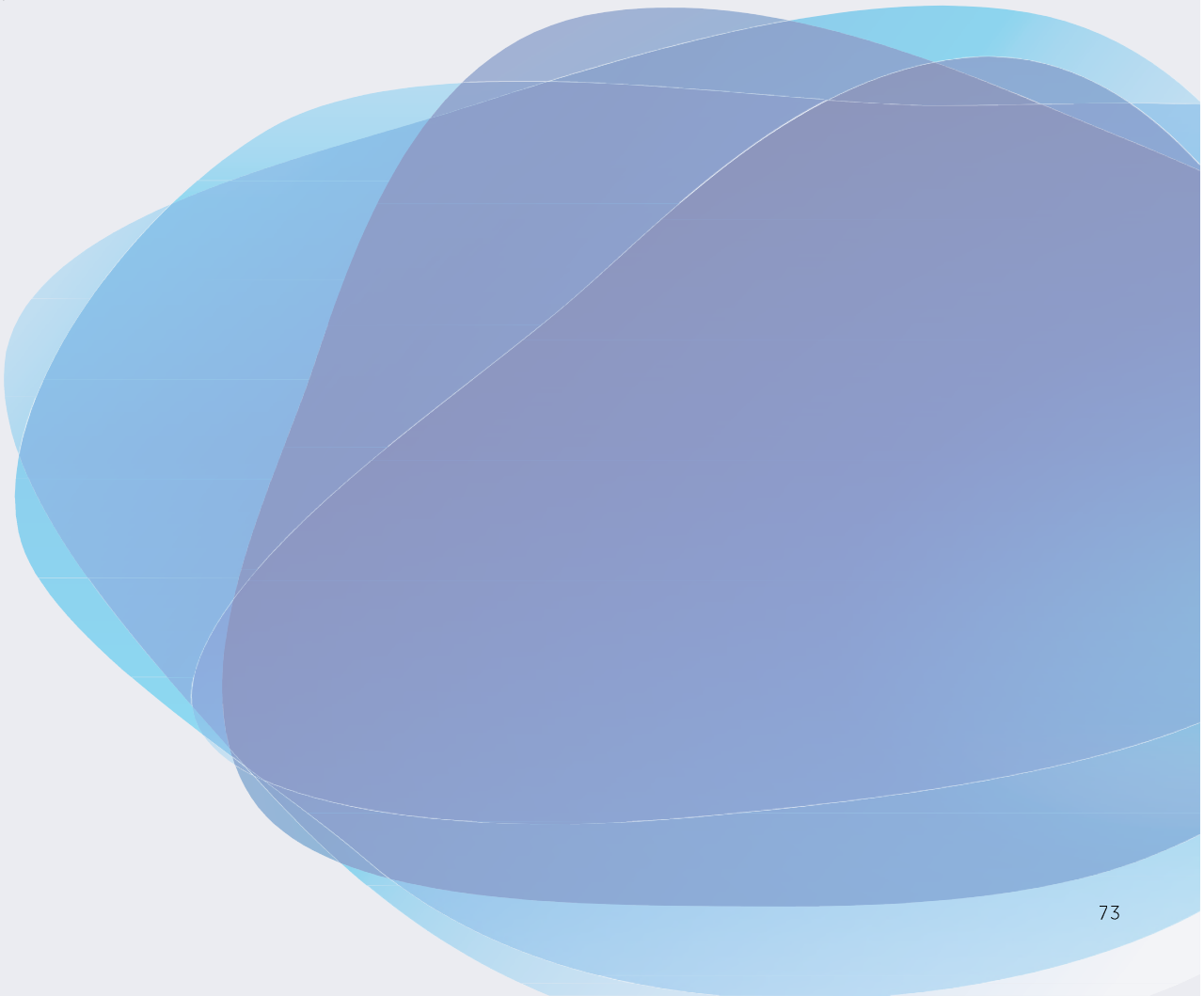

Annex 1. Report Methodology

To compile this report, data voluntarily reported by 2 410 companies were analysed. These companies collectively disclosed nearly 2 500 terawatt-hours (TWh) of annual electricity consumption. The distribution of these companies across sectors is presented in Table A1.1. The sample reflects corporate renewable electricity sourcing practices across a broad geographic and sectoral range, with the goal of identifying practices within the corporate sector. All companies analysed have a renewable electricity consumption or production target and/or must be sourcing renewable electricity. The sample is composed of companies from the following groups:

- **CDP respondents:** Companies in the CDP database whose core business is not the generation or provision of energy to the market and that reported via the CDP climate change questionnaire in 2016 and/or 2017. CDP respondents further include RE100 members disclosing data to CDP as part of their annual progress reporting exercise. Companies reporting data may include multiply subsidiaries of the same holding company.
- **International Renewable Energy Agency (IRENA) survey respondents:** Companies that answered the IRENA corporate survey.

Table A1.1 Distribution of companies analysed in this report

Sector	Description of sectors	Number of companies	Electricity annual consumption (TWh)
Industrial	Sub-sectors include aerospace, building products, construction and engineering, electrical equipment, industrial conglomerates, machinery, trading companies and distributors and commercial services and supplies	531	222
Consumer Discretionary	Sub-sectors include auto components, automobiles, household durables, textiles, apparel and luxury goods, hotels, restaurants and leisure, diversified consumer services and specialty retail	380	262
Financial	Sub-sectors include commercial banks, diversified financial services, consumer finance, capital markets and insurance	342	50
Materials	Sub-sectors include chemicals, construction material, containers and packaging, metals and mining, paper and forest products	330	1 247
Information Technology (IT)	Sub-sectors include software and services, IT services, electronic equipment and instruments, semiconductors and semiconductor equipment	270	186
Consumer Staples	Sub-sectors include food and staples retailing, beverages, food products and household products	221	284
Healthcare	Sub-sectors include healthcare equipment and supplies, healthcare providers and services, healthcare technology and pharmaceuticals	134	40
Real Estate	Sub-sectors include real estate and office service providers	130	30
Telecommunications Services	Sub-sectors include diversified telecommunications services and wireless telecommunications services	72	142
	Total	**2 410**	**2 463**

Note: Sector classifications for this report are drawn from the Global Industry Classification Standard (GICS®).
For a description of the industries covered in each sector, please refer to the definition of GICS sectors in MSCI (2016).

Annex 1. Report Methodology (continued)

Classifications

In terms of sector and industry classification, this report relies on the Global Industry Classification Standard (GICS) for the overall classification and GRI Industry Classification for sub-sectors. For a description of the industries covered in each sector, please refer to the definition of GICS sectors (MSCI, 2016).

The classification of corporate procurement methods used in this report are shown in Table A1.2.

For the purpose of this report, other forms of renewable electricity consumption than mentioned in table A1.2 were not considered (i.e. contracts with suppliers not supported by EACs, etc.). In the absence of a standardised classification system for corporate procurement, data presented in this report may differ from data presented elsewhere (i.e. annual sustainability reports, etc.).

Input data

Input data are the raw data points used for the report. They are largely derived from the CDP and IRENA survey respondents (see further explanation at the beginning of the methodology). Input data are the primary contribution for the development of the "Index".

Both CDP's disclosure programme and the IRENA survey include a provision for companies to mark their response as "public" or "private". Responses marked as "private" have been used only in aggregated form to maintain the privacy of these companies' disclosed information.

Unless otherwise indicated, the proposed indicators were developed using data disclosed by companies in 2016 and 2017. Usually, the data corresponds to activity that took place throughout the report period (e.g., financial year) most recently concluded before the disclosure date.

Data quality control and procedures

In order to ensure data quality, thorough quality checks were conducted:

Consistency checks were used for every company that submitted information for this report to verify that each data point aligns with other information and data that the company reported.

Internal consistency checks were made to remove data points that have been misreported ex ante. Criteria used included comparing total reported electricity consumption and Scope 2 emissions, low carbon energy consumption and associated emission factors, etc. Any data points identified as outliers were investigated in detail by thoroughly reviewing key data points across the companies' responses.

External consistency checks were also conducted by retrieving information from other data sources and trying to reconcile the companies' disclosed energy data with those reported elsewhere.

Table A1.2 Classification of renewable electricity sourcing models

Sourcing model	Including
1 Unbundled energy attribute certificates (EACs)	Includes different types of contractual tracking instruments that represent information about the origin of the energy generated, most commonly guarantees of origin and renewable energy certificates.
2 Power purchase agreements (PPAs)	Includes both on site and off site agreements between a company and an independent power producer or between a company and the utility. Considered PPAs supported by EACs as well as PPAs where electricity attribute certificates do not exist or are not required for a usage claim.
3 Renewable energy offerings from utilities or electric suppliers	Includes both short term renewable energy premium products and longer term contractual arrangements between the utility and a corporation and supported by EACs.
4 Production for self-consumption	Includes both on site and off site systems that the corporate entity owns to produce renewable electricity for self-consumption. This category also includes on site solar PVs leasing contracts and off-grid systems..

Annex 1. Report Methodology (continued)

Index data

The report is composed of two data sets. Market data which provides an overview of renewables sourcing trends within the corporate sector, and company data recognising corporate efforts in sourcing renewables in the focus sectors analysed.

Total renewable electricity consumption (corporate sourcing/consumption of renewable electricity at the global level and per industry/sector)

Percentage of electricity consumption from renewable sources (average percentage of corporate consumption of renewable electricity at the global level and per industry/sector)

Total renewable electricity production (volume of production of renewable electricity over a two-year period at the global level and per industry/sector)

Renewable electricity production as a percentage of total electricity consumption (on site and off site) (production of renewable electricity as a percentage of total electricity consumption at the global level and per industry/sector)

Number of companies reporting renewable electricity targets (adoption of renewable electricity targets in the corporate sector – both renewable electricity production targets and renewable electricity consumption targets – per industry/sector)

Number of corporate renewable electricity targets per level of ambition (adoption of renewable electricity targets in the corporate sector and the level of ambition of these targets)

Percentage of renewable electricity procurement methods (companies' methods of consuming and purchasing renewable energy at the global level per industry/sector and by size).

Top 25 corporate consumers of renewable electricity by sector (procured and self-generated, at the global level, by volume and share of total electricity consumption)

Top 25 corporate producers (prosumers) of renewable electricity (prosumers/producers, at the global level, by volume and share of total electricity consumption).

Data limitations

Most of the 2 410 companies reporting data (>98%) are large publicly listed private-sector companies with more than 250 employees and a revenue of over USD 200 million yearly. Only a small fraction of non-listed privately owned or state-owned companies have reported to CDP or participated in the IRENA survey.

While companies disclose detailed information with regard to volume, share and procurement models used, limited data have been reported with regard to sourcing location and renewable energy technologies used. In the report, graphs and figures only display data from companies that consented to public disclosure.

The sample of 2 410 companies is not necessarily representative to the Commercial & Industrial sector as such. Considering these companies' efforts in reporting extensive data on their climate and energy efforts, it has been assumed that companies actively procuring renewable electricity are more likely to be in the sample. All estimates and extrapolation of data have been made with this aspect in mind.

Annex 2. Company Data

1. Corporate renewable electricity consumption index (excluding companies in the Materials sector)

Company information				Renewable electricity consumption (annual)		Renewable electricity consumption by sourcing model				Renewable electricity targets		
No.	Company	Sector	Country HQ	Renewable electricity consumption (MWh)	Share of Electricity from RE (%)	Production for self-consumption (incl. off-grid)	PPAs	Unbundled EACs	Green procure-ment from utilities	RE target?	Target year	Level of ambition
1	Microsoft Corporation	Information Technology	United States	4,793,774	99%	1,084	796,802	3,995,888	-	Yes	2016	
2	Intel Corporation	Information Technology	United States	4,303,000	79%	50,000	-	4,253,000	-	Yes	2020	90%
3	Volkswagen AG	Consumer Discretionary	Germany	4,032,919	33%	303,165	3,729,754	-	-	No		
4	Deutsche Bahn AG	Industrial	Germany	3,438,553	33%	62,126	-	3,376,427	-	Yes	2020	45%
5	Alphabet, Inc.	Information Technology	United States of America	2,824,021	45%	6,108	2,811,805	-	-	Yes	2017	100%
6	Wal-Mart Stores, Inc.	Consumer Staples	United States of America	2,358,702	8%	2,692	2,072,109	283,901	-	Yes	no target year	100%
7	BT Group	Telecom-munication Services	United Kingdom of Great Britain and Northern Ireland	2,271,087	89%	21	-	-	2,271,066	Yes	2020	100%
8	Telefonica	Telecom-munication Services	Spain	2,228,426	36%	10,036	-	874,873	1,343,517	Yes	2030	100%
9	EQUINIX, INC.	Real Estate	United States of America	2,077,301	56%	-	113,272	714,812	1,249,217	Yes	no target year	100%
10	Apple Inc.	Information Technology	United States of America	1,478,000	102%	350,500	601,000	468,400	53,000	Yes	no target year	100%
11	Unilever plc	Consumer Staples	United Kingdom	1,423,464	46%	147,511	715,182	413,599	147,172	Yes	2020	100%
12	Bank of America	Financial	United States of America	1,369,243	64%	292		1,368,659	-	Yes	2020	100%
13	Cisco Systems, Inc.	Information Technology	United States of America	1,311,425	80%	1,710	-	1,282,681	25,324	Yes	2017	25%
14	East Japan Railway Company	Industrial	Japan	1,310,000	26%	1,310,000	-	-	-	No		
15	Wal Mart de Mexico	Consumer Staples	Mexico	1,276,711	58%	-	1,276,711	-	-	No		
16	Kohl's Cor-poration	Consumer Discretionary	USA	1,242,666	100%	-	-	1,242,666	-	No		
17	BMW AG	Consumer Discretionary	Germany	1,234,710	42%	90,924	-	1,143,786	-	Yes	2020	100%
18	Tesco	Consumer Staples	United Kingdom of Great Britain and Northern Ireland	1,210,000	24%	-	-	1,210,000	-	Yes	2030	100%
19	H&M Hennes & Mauritz AB	Consumer Discretionary	Sweden	1,147,998	83%	-	-	1,147,998	-	Yes	2035	100%
20	Sandvik AB	Industrial	Sweden	1,104,005	76%	-	-	1,104,005	-	No		
21	Honda Motor Company	Consumer Discretionary	Japan	1,047,000	15%	153,000	-	-	894,000	No		
22	Deutsche Post AG	Industrial	Germany	1,013,000	62%	-	-	1,013,000	-	No		
23	Siemens AG	Industrial	Germany	971,230	39%	-	971,230	-	-	No		
24	Hewlett-Packard	Information Technology	United States of America	914,440	27%	8,000	305,000	420,823	180,617	No		
25	Deutsche Telekom AG	Telecom-munication Services	Germany	906,196	13%	3,063	-	878,741	24,393	No		

Annex 2. Company Data (continued)

2. Corporate renewable electricity consumption index, Materials sector

Company information				Renewable electricity consumption		Renewable electricity consumption by sourcing model				Renewable electricity targets		
No.	**Company**	**Sector**	**Country HQ**	**Renewable electricity consumption (MWh)**	**Share of Electricity from RE (%)**	**Production for self-consumption (incl. off-grid)**	**PPAs**	**Unbundled EACs**	**Green procure-ment from utilities**	**RE target?**	**Target year**	**Level of ambition**
1	Rio Tinto	Materials	United Kingdom of Great Britain and Northern Ireland	28,900,000	47%	25,800,000	3,000,000	-	-	No		
2	United Co RUSAL PLC	Materials	Russian Federation	28,608,578	42%	245,050	28,363,528	-	-	Yes	2025	95%
3	South32	Materials	Australia	17,707,553	81%	9,575,103	8,132,450	-	-	No		
4	Norsk Hydro	Materials	Norway	11,332,000	39%	11,332,000	-	-	-	No		
5	Vale	Materials	Brazil	9,597,675	56%	2,794,807	5,829,417	-	-	No		
6	AkzoNobel	Materials	Netherlands	5,456,000	62%	-	4,965,000	-	-	Yes	2050	100%
7	Anglo Ameri-can	Materials	United Kingdom of Great Britain and Northern Ireland	4,700,678	29%	2,660,592	-	2,034,016	-	No		
8	Stora Enso Oyj	Materials	Finland	4,394,131	34%	3,986,411	407,720	-	-	No		
9	UPM-Ky-mmene Corporation	Materials	Finland	3,700,000	25%	3,700,000	-	-	-	Yes	2016	69%
10	Glencore plc	Materials	Switzerland	3,155,117	11%	3,155,117	-	-	-	Yes	2016	6%
11	WestRock Company	Materials	United States of America	3,116,097	30%	3,116,097	-	-	-	No		
12	ArcelorMittal	Materials	Luxembourg	2,954,480	6%	1,477,240	-	-	-	No		
13	Holmen	Materials	Sweden	2,674,400	68%	1,796,000	-	-	878,400	Yes	2020	50%
14	Mondi PLC	Materials	United Kingdom of Great Britain and Northern Ireland	2,641,000	38%	2,641,000	-	-	-	No		
15	FIBRIA Celu-lose S/A	Materials	Brazil	2,482,963	85%	2,482,963	-	-	-	No		
16	China Steel Corporation	Materials	Taiwan	2,069,521	42%	770	-	-	1,500	No		
17	Empresas CMPC	Materials	Chile	2,004,000	100%	2,004,000	-	-	-	Yes	2020	80%
18	Sappi	Materials	South Africa	1,941,447	31%	1,941,447	-	-	-	No		
19	Teck Resources Limited	Materials	Canada	1,850,823	39%	1,801,047	49,776	-	-	Yes	2030	100%
20	thyssenk-rupp AG	Materials	Germany	1,820,100	22%	100	-	-	-	No		
21	Billerud-Korsnäs	Materials	Sweden	1,469,071	48%	1,414,725	-	38,926	-	Yes	2020	100%
22	Klabin S/A	Materials	Brazil	1,401,895	46%	1,401,895	-	-	-	No		
23	Braskem S/A	Materials	Brazil	1,329,772	20%	-	-	-	-	No		
24	Smurfit Kappa Group PLC	Materials	Ireland	1,092,000	23%	1,092,000	-	-	-	No		
25	Resolute Forest Products Inc.	Materials	Canada	1,086,814	9%	1,086,814	-	-	-	No		

Annex 2. Company Data (continued)

3. Corporate renewable electricity consumption index, Financial sector

Company information				Renewable electricity consumption		Renewable electricity consumption by sourcing model				Renewable electricity targets		
No.	Company	Sector	Country HQ	Renewable electricity consumption (MWh)	Share of Electricity from RE (%)	Production for self-consumption (incl. off-grid)	PPAs	Unbundled EACs	Green procure-ment from utilities	RE target?	Target year	Level of ambition
1	Bank of America	Financial	United States of America	1,369,243	64%	292	-	1,368,659	-	Yes	2020	100%
2	TD Bank Group	Financial	Canada	574,198	100%	-	-	571,931	-	Yes	2016	100%
3	Barclays	Financial	United Kingdom of Great Britain and Northern Ireland	469,421	62%	-	-	-	469,421	No		
4	Itausa Investimentos Itau S.A.	Financial	Brazil	457,808	30%	26,280	431,528	-	-	Yes	2020	96%
5	Banco Santander	Financial	Spain	448,157	41%	-	-	-	448,157	No		
6	Goldman Sachs Group Inc.	Financial	United States of America	440,901	90%	-	-	440,901	-	Yes	2020	100%
7	Itaú Unibanco Holding S.A.	Financial	Brazil	431,528	68%	-	431,528	-	-	Yes	2020	96%
8	Credit Agricole	Financial	France	412,765	100%	-	-	-	-	Yes	2016	100%
9	UniCredit	Financial	Italy	394,712	70%	231	-	394,481	-	No		
10	Intesa San-paolo S.p.A	Financial	Italy	355,361	76%	1,050	-	349,973	4,338	Yes	2022	81%
11	BNY Mellon	Financial	United States of America	323,998	100%	110	-	323,888	-	Yes	2017	100%
12	HSBC Hold-ings plc	Financial	United Kingdom of Great Britain and Northern Ireland	318,706	29%	160	89,990	216,107	12,449	Yes	2030	100%
13	UBS	Financial	Switzerland	272,483	52%	278	-	-	272,205	Yes	2020	100%
14	BNP Paribas	Financial	France	257,583	24%	1,694	-	253,871	-	No		
15	Allianz SE	Financial	Germany	245,317	45%	17	-	-	245,283	No		
16	ING Group	Financial	Netherlands	215,456	83%	24	9,020	191,109	15,279	Yes	2020	100%
17	JPMorgan Chase & Co.	Financial	United States of America	214,474	11%	2,237	-	210,000	-	Yes	2020	100%
18	MetLife, Inc.	Financial	United States of America	204,588	85%	-	-	204,588	-	No		
19	State Street Corporation	Financial	United States of America	187,795	75%	-	-	187,795	-	No		
20	Commerz-bank AG	Financial	Germany	187,495	88%	-	-	187,495	-	Yes	2019	100%
21	Citigroup Inc.	Financial	United States of America	179,469	12%	70	74,573	104,826	-	Yes	2020	100%
22	Remgro	Financial	South Africa	171,219	30%	171,219	-	-	-	No		
23	CaixaBank	Financial	Spain	170,605	99%	-	-	170,605	-	Yes	2040	100%
24	American Express	Financial	United States of America	150,000	59%	566	-	150,000	-	Yes	2040	100%
25	Credit Suisse	Financial	Switzerland	147,274	32%	1570	-	145,704	-	No		

Annex 2. Company Data (continued)

4. Corporate renewable electricity consumption index, Information Technology sector

Company information				Renewable electricity consumption		Renewable electricity consumption by sourcing model				Renewable electricity targets		
No.	Company	Sector	Country HQ	Renewable electricity consumption (MWh)	Share of Electricity from RE (%)	Production for self-consumption (incl. off-grid)	PPAs	Unbundled EACs	Green procure-ment from utilities	RE target?	Target year	Level of ambition
1	Microsoft Corporation	Information Technology	United States of America	4,793,774	99%	542	796,802	3,995,888	-	Yes	2016	100%
2	Intel Corporation	Information Technology	United States of America	4,303,000	79%	50,000	-	4,253,000	-	Yes	2020	90%
3	Alphabet, Inc.	Information Technology	United States of America	2,824,021	45%	6,108	2,811,805	-	-	Yes	2017	100%
4	Apple Inc.	Information Technology	United States of America	1,478,000	102%	350,500	601,000	468,400	53,000	Yes	no target year	100%
5	Cisco Systems, Inc.	Information Technology	United States of America	1,311,425	80%	1,710	-	1,282,681	25,324	Yes	2017	25%
6	Hewlett-Packard	Information Technology	United States of America	914,440	27%	8,000	305,000	420,823	180,617	No		
7	Hewlett Packard Enterprise Company	Information Technology	United States of America	798,466	27%	2,000	265,130	531,336	-	Yes	2025	100%
8	International Business Machines (IBM)	Information Technology	United States of America	722,180	20%	-	47,626	1,337	672,288	Yes	2020	20%
9	SAP SE	Information Technology	Germany	440,147	124%	147	-	440,000	-	Yes	2014	100%
10	STMicro-electronics International NV	Information Technology	Switzerland	375,699	18%	1,974	-	371,751	-	Yes	2020	30%
11	Ericsson	Information Technology	Sweden	351,040	46%	-	-	351,040	-	No		
12	Dell Technologies	Information Technology	United States of America	293,176	24%	287	-	76,923	215,966	Yes	2020	50%
13	Dell Inc.	Information Technology	United States of America	267,954	41%	172	-	-	267,782	Yes	2020	50%
14	Altaba Inc.	Information Technology	United States of America	251,951	43%	1,095	101,921	-	147,840	No		
15	Nokia Group	Information Technology	Finland	212,515	21%	-	-	212,515	-	Yes	2016	15%
16	eBay Inc.	Information Technology	United States of America	175,792	47%	275	-	175,242	-	Yes	2025	100%
17	Samsung Electronics	Information Technology	Republic of Korea	170,810	1%	16,000	-	80,000	58,000	No		
18	Infosys Limited	Information Technology	India	118,903	45%	17,572	101,331	-	-	Yes	2020	100%
19	Fujitsu Ltd.	Information Technology	Japan	116,700	6%	700	-	24,000	92,000	Yes	2018	6%
20	FUJIFILM Holdings Corporation	Information Technology	Japan	101,812	6%	18,777	-	-	83,035	No		
21	salesforce.com	Information Technology	United States of America	93,302	25%	-	-	93,302	-	Yes	no target year	100%
22	MasterCard Incorporated	Information Technology	United States of America	89,812	58%	-	-	86,467	3,345	No		
23	Cap Gemini	Information Technology	France	77,877	20%	300	-	78,177	-	No		
24	Wipro	Information Technology	India	76,466	19%	-	76,466	-	-	Yes	2020	36%
25	LG Innotek	Information Technology	Republic of Korea	64,631	4%	64,631	-	-	-	No		

Annex 2. Company Data (continued)

5. Corporate renewable electricity production for self-consumption index

Company information				Renewable electricity consumption		Renewable electricity consumption by sourcing model				Renewable electricity targets		
No.	Company	Sector	Country HQ	Renewable electricity consumption (MWh)	Share of Electricity from RE (%)	Production for self-consumption (incl. off-grid)	PPAs	Unbundled EACs	Green procure-ment from utilities	RE target?	Target year	Level of ambition
1	Volkswagen AG	Consumer Discretionary	Germany	4,032,919	33%	303,165	3,729,754			No		
2	Deutsche Bahn AG	Industrial	Germany	3,438,553	33%	62,126	-	3,376,427	-	Yes	2020	45%
3	Apple Inc.	Information Technology	United States of America	1,478,000	102%	350,500	601,000	468,400	53,000	Yes	no target year	100%
4	East Japan Railway Company	Industrial	Japan	1,310,000	26%	1,310,000	-	-	-	No		
5	IKEA	Consumer Discretionary	Sweden	704,256	23%	704,256	-	-	-	Yes	2020	100%
6	Illovo Sugar Ltd	Consumer Staples	South Africa	454,087	57%	454,087	-	-	-	No		
7	Bunge	Consumer Staples	United States of America	436,545	16%	436,545	-	-	-	No		
8	Tongaat Hulett Ltd	Consumer Staples	South Africa	407,660	63%	407,660	-	-	-	No		
9	S Group	Consumer Discretionary	Finland	401,326	33%	401,326	-	-	-	Yes	2016	50%
10	Cargill	Consumer Staples	United States of America	389,170	3%	389,170	-	-	-	No		
11	General Motors Company	Consumer Discretionary	United States of America	292,536	3%	292,536	-	-	-	Yes	2050	100%
12	RCL Foods Ltd	Consumer Staples	South Africa	239,684	33%	239,684	-	-	-	No		
13	Kuehne + Nagel Inter-national AG	Industrial	Switzerland	217,482	31%	111,721	43,615	62,146	-	Yes	2020	10%
14	Furukawa Electric Co., Ltd.	Industrial	Japan	200,072	15%	95,007	-	105,065	-	Yes	2017	15%
15	Remgro	Financial	South Africa	171,219	30%	171,219	-	-	-	No		
16	Charoen Pokphand Foods PCL	Consumer Staples	Thailand	169,353	12%	169,353	-	-	-	No		
17	Reckitt Benckiser	Consumer Staples	United Kingdom of Great Britain and Northern Ireland	164,732	39%	164,732	-	-	-	Yes	2030	100%
18	Golden Agri-Resources	Consumer Staples	Singapore	152,174	89%	152,174	-	-	-	No		
19	Wilmar International Limited	Consumer Staples	Singapore	121,244	11%	121,244	-	-	-	No		
20	PT Musim Mas	Consumer Staples	Singapore	120,947	21%	120,947	-	-	-	No		
21	TEKFEN HOLDING A.S.	Industrial	Turkey	97,969	52%	97,969	-	-	-	No		
22	Costco Wholesale Corporation	Consumer Staples	United States of America	62,516	2%	62,516	-	-	-	No		
23	China Mobile	Telecom-munication Services	China	60,282	0.3%	60,282	-	-	-	No		
24	Bharat Forge	Consumer Discretionary	India	60,000	18%	60,000	-	-	-	No		
25	Seven & I Holdings Co., Ltd.	Consumer Staples	Japan	58,014	1%	58,014	-	-	-	No		

Annex 3. Options for Corporate Sourcing of Renewable Electricity, by Country

Country	Energy Attribute Certificates (EACs)	Corporate Power Purchase Agreements (PPAs)	Renewable Energy Offerings from Utilities or Electric Suppliers	Production for self-consumption	Third Party Sales	Net Metering
Algeria		●		●		
Argentina		●		●	●	●
Australia	●	●	●	●	●	●
Austria	●	●	●	●	●	
Bahrain						●
Belgium	●	●	●	●	●	●
Brazil	●	●		●	●	●
Bulgaria	●		●	●		
Burkina Faso		●		●		
Canada	●	●	●	●	●	●
Chile	●	●		●		●
China	●			●	●	●
Colombia	●			●	●	●
Croatia	●					
Cyprus	●			●		●
Czech Republic	●		●	●	●	
Denmark	●	●	●	●	●	●
Dominican Republic				●	●	●
Egypt		●		●	●	●
Eritrea		●		●		
Estonia	●		●			
Fiji				●		
Finland	●	●	●	●	●	
France	●	●	●	●	●	
Germany	●	●	●	●	●	
Ghana		●		●	●	●
Greece	●		●	●	●	●
Guatemala	●			●	●	●
Honduras	●			●		●
Hungary	●		●	●		
Iceland	●	●	●	●		
India	●	●	●	●	●	●
Indonesia				●	●	
Ireland	●	●	●	●		
Israel	●			●		●
Italy [i]	●	●	●	●	●	●
Japan	●		●	●	●	●
Jordan	●	●		●		●
Kazakhstan				●	●	
Kenya		●		●		●
Latvia	●		●			●

Annex 3. Options for Corporate Sourcing of Renewable Electricity, by Country (continued)

Country	Energy Attribute Certificates (EACs)	Corporate Power Purchase Agreements (PPAs)	Renewable Energy Offerings from Utilities or Electric Suppliers	Production for self-consumption	Third Party Sales	Net Metering
Lithuania	●		●	●		●
Luxembourg	●		●			
Malaysia	●			●		
Malta	●			●		
Mexico	●	●	●	●	●	●
Morocco		●	●	●	●	●
Namibia		●		●		
Netherlands	●	●	●	●	●	●
New Zealand		●		●		●
Norway	●	●	●	●	●	
Pakistan				●		●
Panama		●		●	●	●
Philippines	●			●	●	●
Poland	●		●	●	●	
Portugal	●	●	●	●		
Republic of Korea	●		●	●	●	●
Romania	●				●	
Saudi Arabia	●					
Singapore	●	●	●	●		●
Slovakia	●		●			
Slovenia	●		●			●
South Africa	●		●	●	●	
South Sudan			●		●	
Spain	●		●	●	●	
Sweden	●	●	●	●	●	
Switzerland	●			●	●	
Thailand	●	●	●	●	●	
Turkey	●					
Uganda	●			●		
United Arab Emirates	●		●	●		
United Kingdom	●	●	●	●	●	
United Republic of Tanzania				●		●
United States of America	●	●	●	●	●	●
Vietnam	●					●

[i] Italy has retired the trading of green certificates as of 2016, but still has a Guarantees of Origin system in place.

Note: The table indicates countries where corporate sourcing takes place through different procurement options (either through power purchase agreements, utility green procurement programmes, the purchase of unbundled renewable energy attribute certificates and/or direct investments in production for self-consumption). The table further highlights countries where third party sales and net metering schemes have been put in place.

Disclaimer: The country names shown in this table do not imply any official endorsement or acceptance by IRENA. The term "country" as used in this material also refers, as appropriate, to territories or areas.

IRENA
International Renewable Energy Agency

Corporate Sourcing of Renewables:

Market and Industry Trends

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EXHIBIT KMM-8

PNM to Add 100MW of Solar in New Mexico to Serve Facebook Data Center

Company Release - 10/19/2018 12:41

ALBUQUERQUE, N.M., Oct. 19, 2018 /PRNewswire/ -- PNM Resources' (NYSE: PNM) New Mexico utility, PNM, received approval on Wednesday from the New Mexico Public Regulation Commission (NMPRC) to purchase 100 megawatts of solar generation from NM Renewable Development, LLC (NMRD) in order to continue serving the Facebook data center in New Mexico with 100 percent renewable energy. This addition supports the goal to achieve a more sustainable energy portfolio at PNM.

"Opportunities for solar energy are abundant in New Mexico, and Facebook's growth allows us to demonstrate our commitment to making our state a sustainable energy leader," said Pat Vincent-Collawn, chairman, president and CEO of PNM Resources. "We are proud to support Facebook's presence in New Mexico."

NMRD, a joint venture between subsidiaries of PNM Resources and American Electric Power, will build two 50 megawatt solar photovoltaic generation facilities in New Mexico. The first facility is expected to be operational by the end of 2019, followed by the second facility in June 2020. Each facility is expected to result in approximately $70 million of investment in New Mexico and create approximately 200 construction jobs.

"With these two new projects, we have worked with PNM to bring 396 megawatts of new wind and solar projects that will contribute to a greener grid and help bring more renewable energy and investment to New Mexico," said Bobby Hollis, Head of Global Energy at Facebook. "We appreciate New Mexico's supportive environment that has enabled us to procure this amount of renewable energy so quickly."

Solar and wind projects constructed to serve Facebook are expected to total approximately $800 million of investment in New Mexico and create over 1,300 construction and permanent jobs, representing significant economic development in Valencia, Bernalillo, Quay, Torrance, Cibola and Sandoval counties.

The agreements are subject to approval from the Federal Energy Regulatory Commission.

Background:
PNM Resources (NYSE: PNM) is an energy holding company based in Albuquerque, N.M., with 2017 consolidated operating revenues of $1.4 billion. Through its regulated utilities, PNM and TNMP, PNM Resources has approximately 2,580 megawatts of generation capacity and provides electricity to more than 773,000 homes and businesses in New Mexico and Texas. For more information, visit the company's website at www.PNMResources.com.

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Safe Harbor Statement under the Private Securities Litigation Reform Act of 1995
Statements made in this news release that relate to future events or PNM Resources, Inc.'s ("PNMR") or Public Service Company of New Mexico's ("PNM") (collectively, the "Company") expectations, projections, estimates, intentions, goals, targets, and strategies are made pursuant to the Private Securities Litigation Reform Act of 1995. Readers are cautioned that all forward-looking statements are based upon current expectations and estimates. PNMR and PNM assume no obligation to update this information. Because actual results may differ materially from those expressed or implied by these forward-looking statements, PNMR and PNM caution readers not to place undue reliance on these statements. PNMR's and PNM's business, financial condition, cash flow, and operating results are influenced by many factors, which are often beyond their control, that can cause actual results to differ from those expressed or implied by the forward-looking statements. For a discussion of risk factors and other important factors affecting forward-looking statements, please see the Company's Form 10-K and Form 10-Q filings with the Securities and Exchange Commission, which factors are specifically incorporated by reference herein.

View original content to download multimedia:http://www.prnewswire.com/news-releases/pnm-to-add-100mw-of-solar-in-new-mexico-to-serve-facebook-data-center-300734406.html

SOURCE PNM Resources, Inc.

EXHIBIT KMM-9


AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY℠
53rd EEI FINANCIAL CONFERENCE
San Francisco, California
November 11-14, 2018

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This presentation contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934. Although AEP and each of its Registrant Subsidiaries believe that their expectations are based on reasonable assumptions, any such statements may be influenced by factors that could cause actual outcomes and results to be materially different from those projected. Among the factors that could cause actual results to differ materially from those in the forward-looking statements are: economic growth or contraction within and changes in market demand and demographic patterns in AEP service territories, inflationary or deflationary interest rate trends, volatility in the financial markets, particularly developments affecting the availability or cost of capital to finance new capital projects and refinance existing debt, the availability and cost of funds to finance working capital and capital needs, particularly during periods when the time lag between incurring costs and recovery is long and the costs are material, electric load and customer growth, weather conditions, including storms and drought conditions, and the ability to recover significant storm restoration costs, the cost of fuel and its transportation, the creditworthiness and performance of fuel suppliers and transporters and the cost of storing and disposing of used fuel, including coal ash and spent nuclear fuel, availability of necessary generation capacity, the performance of generation plants and the availability of fuel, including processed nuclear fuel, parts and service from reliable vendors, the ability to recover fuel and other energy costs through regulated or competitive electric rates, the ability to build renewable generation, transmission lines and facilities (including the ability to obtain any necessary regulatory approvals and permits) when needed at acceptable prices and terms and to recover those costs, new legislation, litigation and government regulation, including oversight of nuclear generation, energy commodity trading and new or heightened requirements for reduced emissions of sulfur, nitrogen, mercury, carbon, soot or particulate matter and other substances that could impact the continued operation, cost recovery and/or profitability of generation plants and related assets, evolving public perception of the risks associated with fuels used before, during and after the generation of electricity, including nuclear fuel, timing and resolution of pending and future rate cases, negotiations and other regulatory decisions, including rate or other recovery of new investments in generation, distribution and transmission service, environmental compliance and excess accumulated deferred income taxes, resolution of litigation, the ability to constrain operation and maintenance costs, prices and demand for power generated and sold at wholesale, changes in technology, particularly with respect to energy storage and new, developing, alternative or distributed sources of generation, the ability to recover through rates any remaining unrecovered investment in generation units that may be retired before the end of their previously projected useful lives, volatility and changes in markets for capacity and electricity, coal and other energy-related commodities, particularly changes in the price of natural gas, changes in utility regulation and the allocation of costs within regional transmission organizations, including ERCOT, PJM and SPP, changes in the creditworthiness of the counterparties with contractual arrangements, including participants in the energy trading market, actions of rating agencies, including changes in the ratings of debt, the impact of volatility in the capital markets on the value of the investments held by the pension, other postretirement benefit plans, captive insurance entity and nuclear decommissioning trust and the impact of such volatility on future funding requirements, accounting pronouncements periodically issued by accounting standard-setting bodies, impact of federal tax reform on customer rates, income tax expense and cash flows, and other risks and unforeseen events, including wars, the effects of terrorism (including increased security costs), embargoes, cyber security threats and other catastrophic events.

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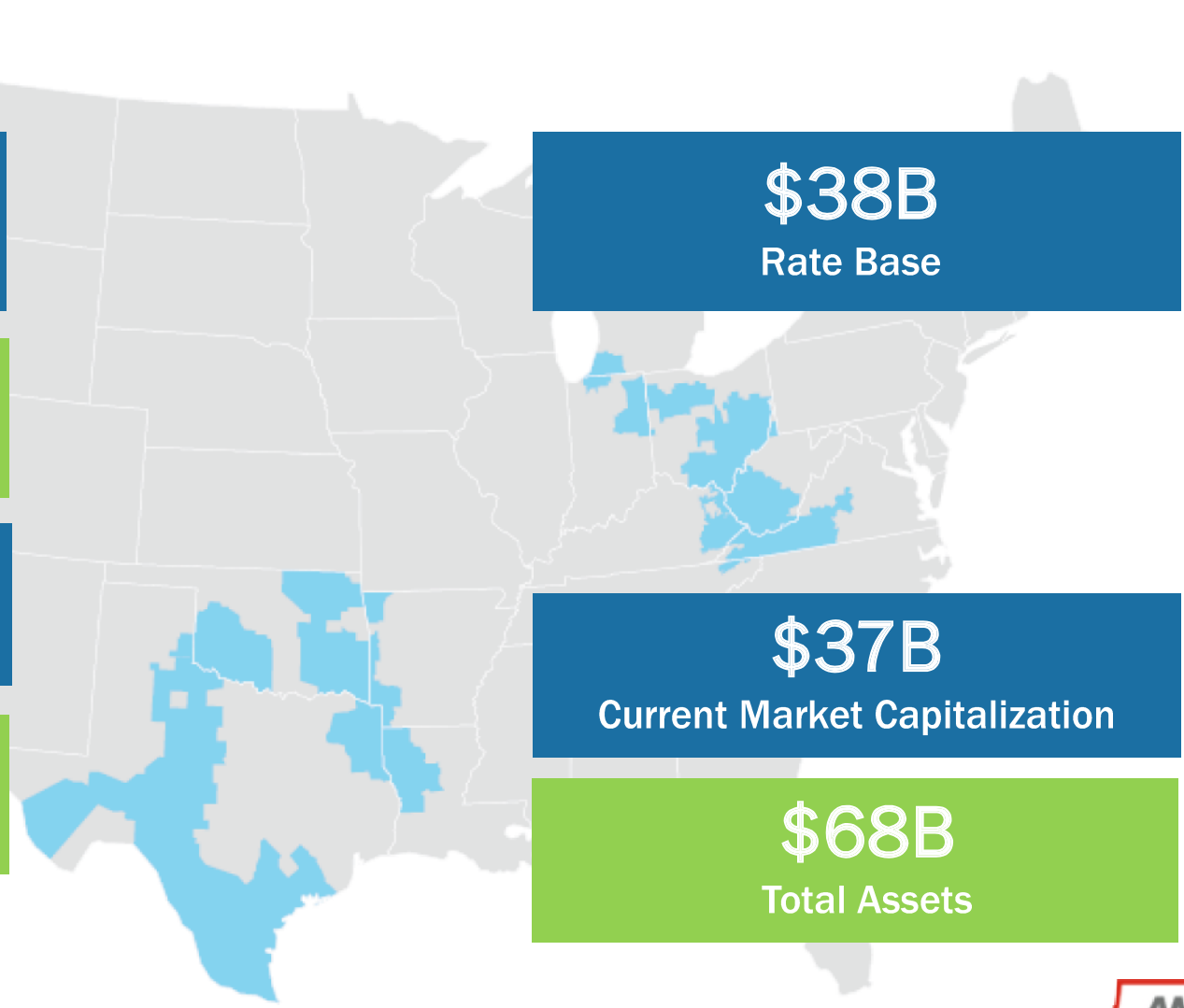
AMERICAN ELECTRIC POWER

THE PREMIER REGULATED ENERGY COMPANY



40,000
Miles of Transmission

5.4M
Customers in 11 States

26GW
Owned Generation

18,000+
Employees

$38B
Rate Base

$37B
Current Market Capitalization

$68B
Total Assets

Note: Statistics as of September 30, 2018 except for market capitalization as of November 7, 2018 and rate base as of December 31, 2017

AMERICAN ELECTRIC POWER

HIGHER growth

HIGHER dividends

The Premier Regulated Energy Company

MORE certainty

MORE regulated

Positioned to Deliver Superior Risk Adjusted Returns

STRONG EXECUTION TRACK RECORD

Delivered Earnings & Dividend Growth	Successful Regulatory Outcomes	Superior Capital Allocation	Balance Sheet Strength	Sale of Non-Core Assets

AEP LEADING THE WAY FORWARD

Confidence in Steady and Predictable Earnings Growth Rate of 5-7%	Commitment to Growing Dividend Consistent with Earnings	Well Positioned as a Sustainable Regulated Business	Compelling Portfolio of Premium Investment Opportunities

AMERICAN ELECTRIC POWER

STRATEGIC VISION 2023

Execute Strategy

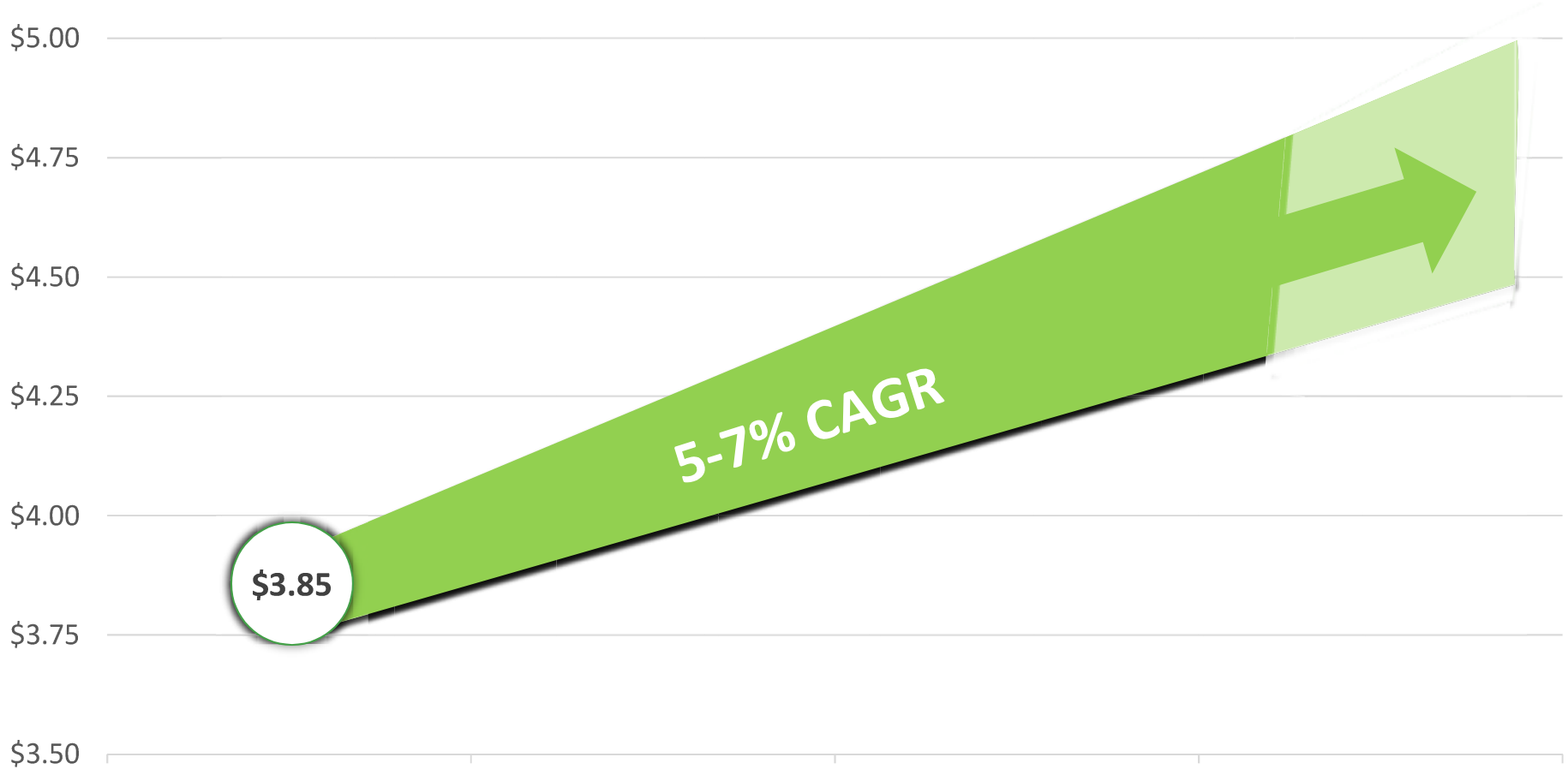
- Improve customer experience
- Invest in transmission and distribution networks
- Invest in regulated and contracted renewables
- Mitigate fossil and nuclear generation risk and optimize operations
- Relentless O&M optimization/Future of work

Initiative Themes

- Invest in infrastructure and renewables
- Pilot technologies and business models
- Mitigate generation exposure
- Manage customer bills
- Grow load
- Improve operations

We are focused on executing our strategy while improving the customer experience

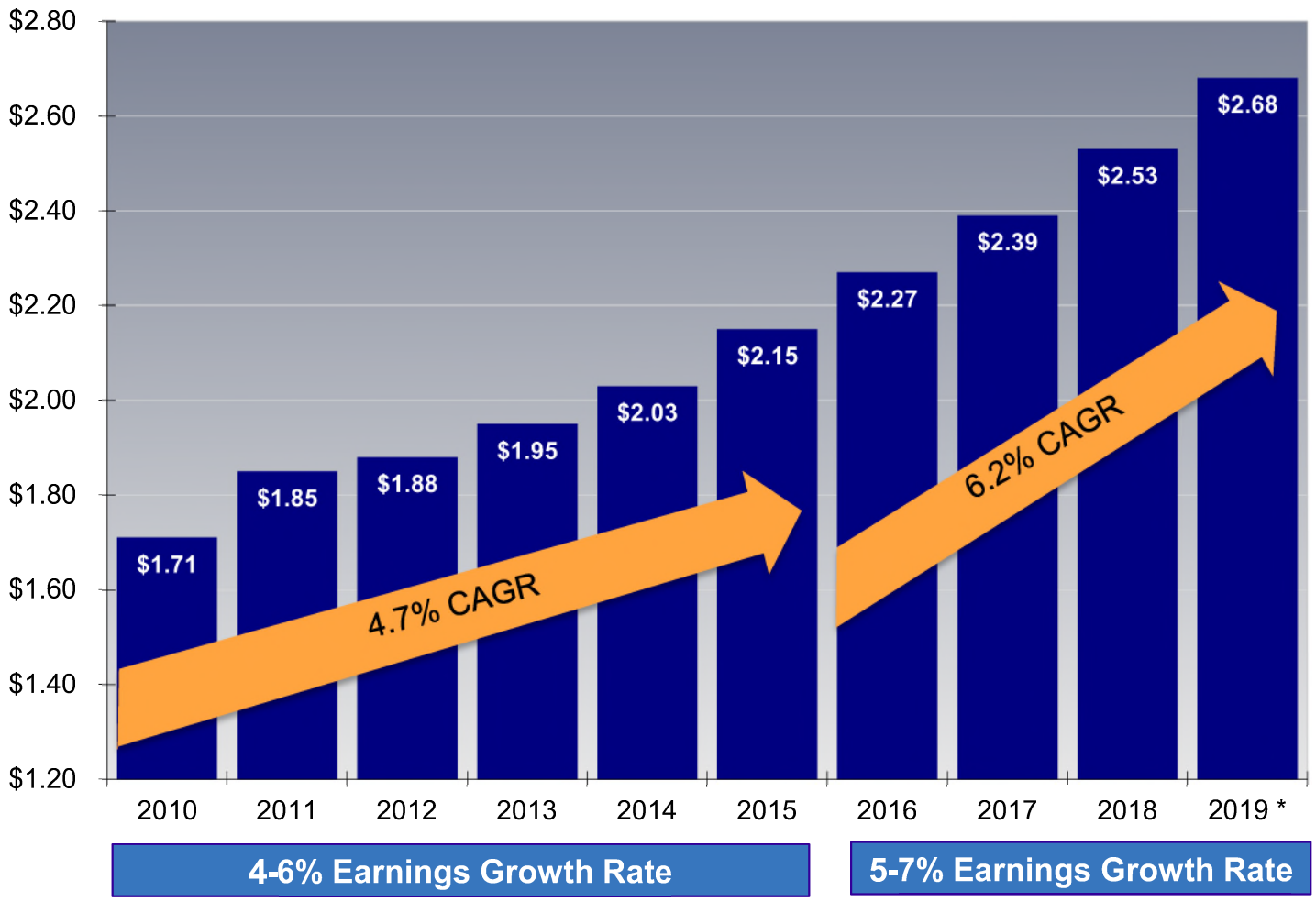
ORGANIC INVESTMENT OPPORTUNITY + MANAGEABLE EXECUTION RISK = GROWTH



	2018	2019	2020	Future
Operating Earnings Guidance	$3.75 - $3.95 Narrowed and Raised to $3.88 - $3.98	$4.00 - $4.20	$4.25 - $4.45	

STRONG DIVIDEND GROWTH

- Targeted payout ratio 60-70% of operating earnings
- Over 108 years of consecutive quarterly dividends
- Dividend growth in line with earnings



EPS Growth + Dividend Yield = 9 to 11% Annual Return Opportunity

* Subject to Board approval

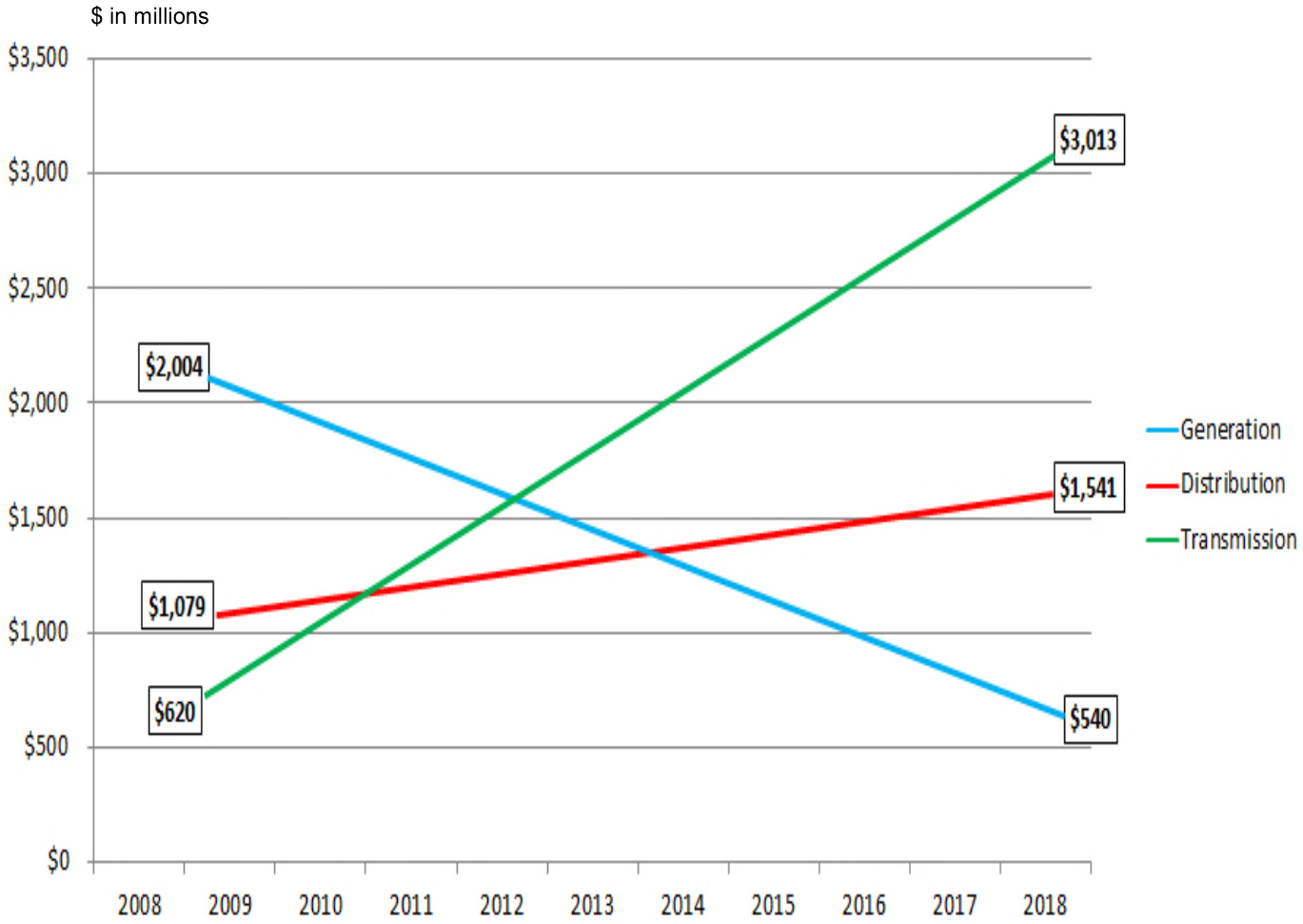

POSITIONING FOR THE FUTURE
CAPITAL INVESTMENT OPPORTUNITIES

ROBUST ORGANIC CAPITAL OPPORTUNITIES

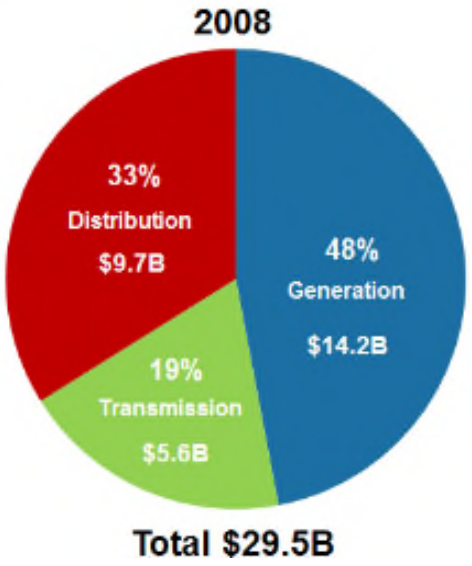
Transmission	**Grid modernization, aging infrastructure, physical/cyber security, reliability, market efficiency and economic development projects**
Distribution	**Grid modernization, reliability improvement projects and distribution station refurbishment**
Renewables	**Regulated renewables supported by integrated resource plans and contracted renewables**
Technology	**Digitization, automation, cyber security, enterprise-wide applications**

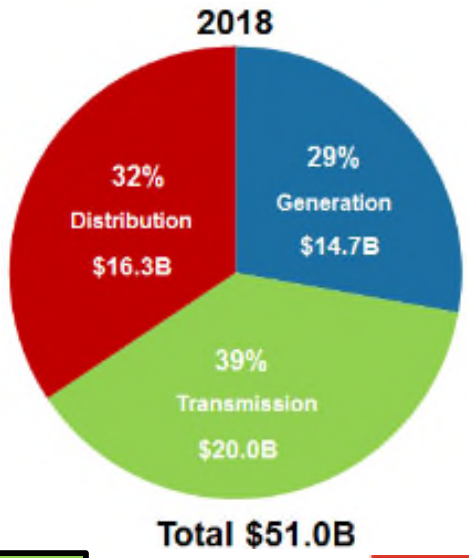
AMERICAN ELECTRIC POWER

ANNUAL CAPITAL INVESTMENT HISTORY



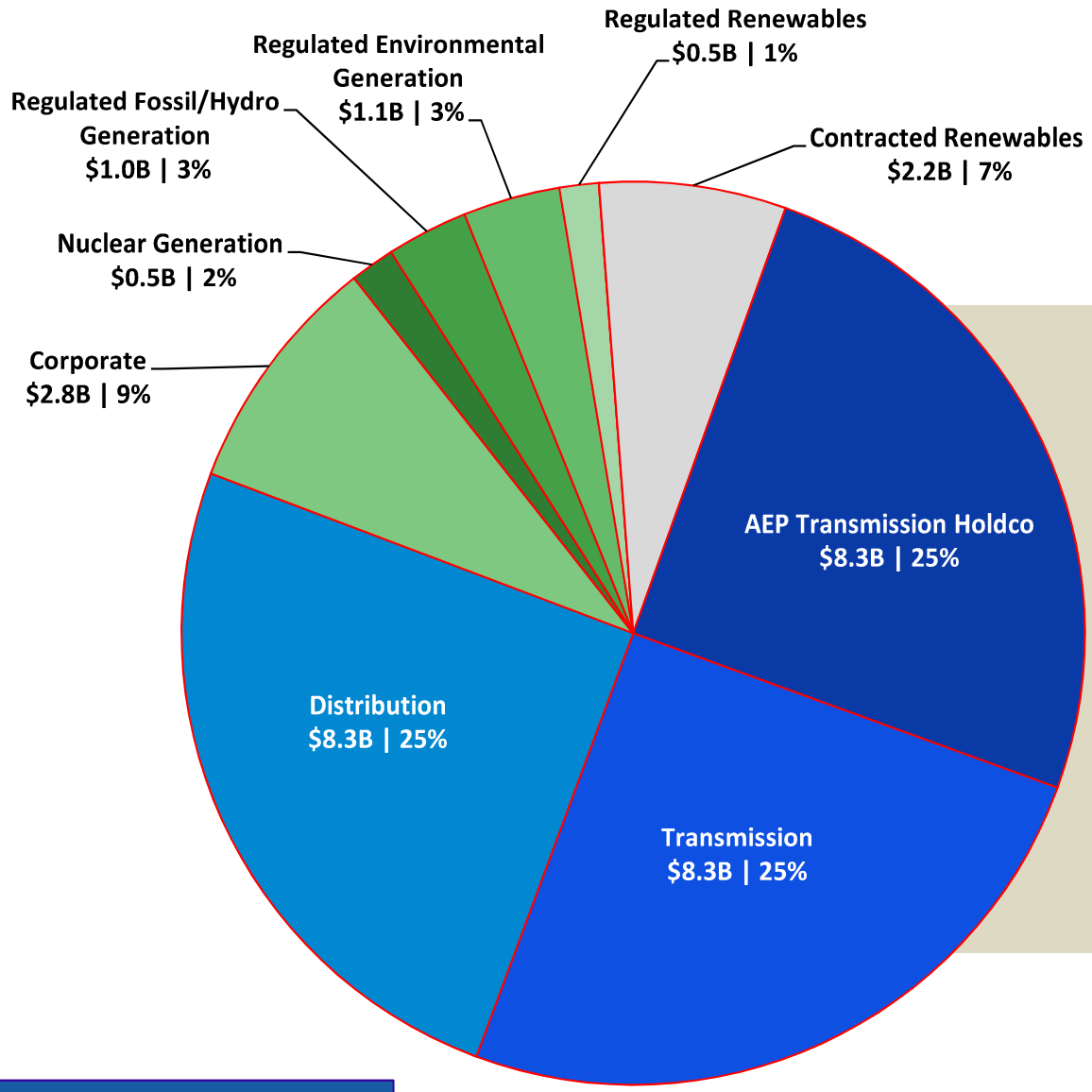
NET PLANT PROFILES





AEP has invested in reliability and grid strengthening over the last decade, dramatically changing the capital allocation in Generation, Transmission and Distribution

2019 – 2023 CAPITAL FORECAST: TOTAL $33B



100%

of capital allocated to regulated businesses and contracted renewables

75%

allocated to wires

Focus on wires and renewables

AMERICAN ELECTRIC POWER

CASH FLOWS AND FINANCIAL METRICS

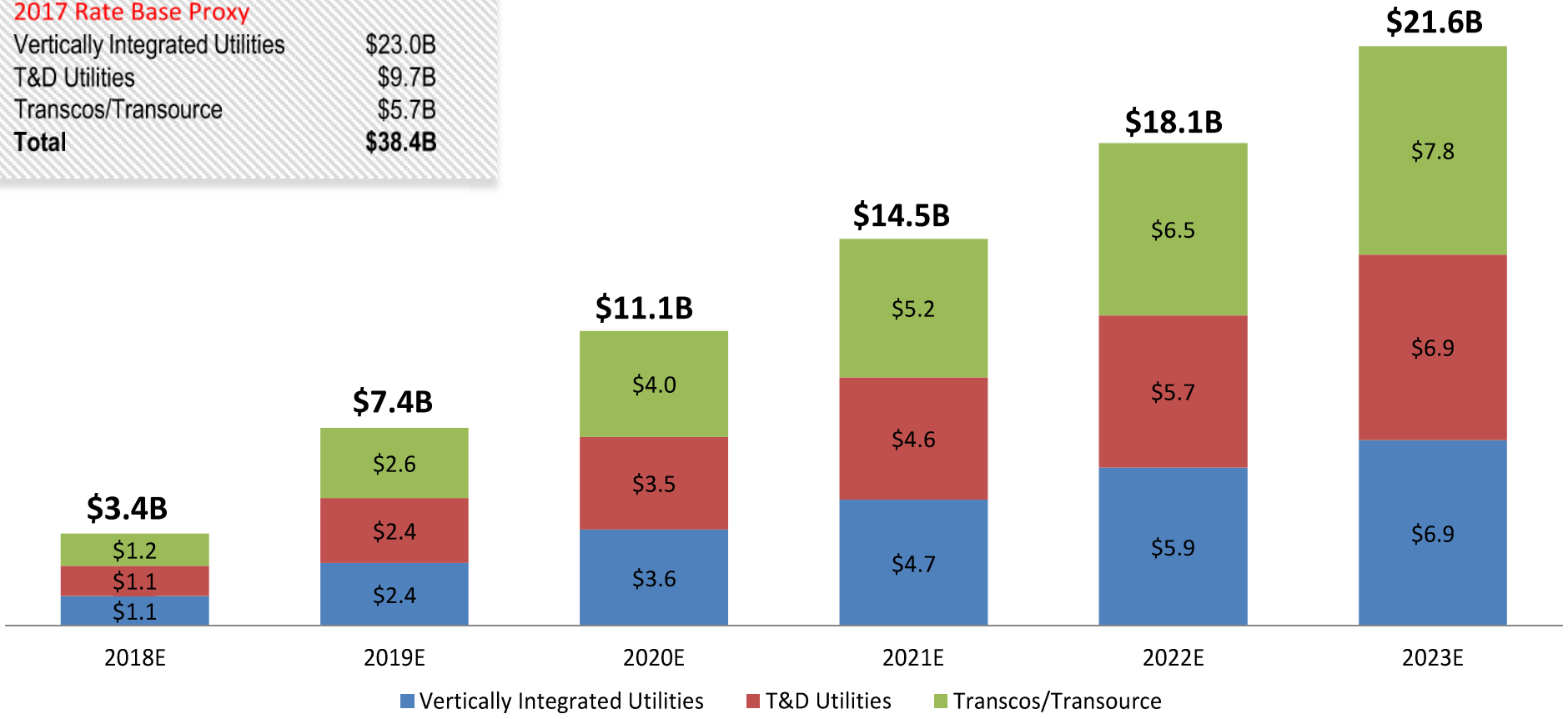
$ in millions	2018E	2019E	2020E	2021E
Cash from Operations	$ 4,700	$ 4,700	$ 4,900	$ 5,300
Capital & JV Equity Contributions	(6,100)	(6,500)	(6,100)	(6,300)
Other Investing Activities	(700)	(300)	(400)	(100)
Common Dividends *	(1,300)	(1,300)	(1,300)	(1,400)
Excess (Required) Capital	$ (3,400)	$ (3,400)	$ (2,900)	$ (2,500)
Financing				
Excess (Required) Capital	$ (3,400)	$ (3,400)	$ (2,900)	$ (2,500)
Debt Maturities (Senior Notes, PCRBs)	(2,400)	(1,100)	(900)	(1,500)
Securitization Amortizations	(300)	(300)	(200)	(100)
Equity Issuances - Includes DRP/401(k)	100	100	500	500
Debt Capital Market Needs (New)	$ (6,000)	$ (4,700)	$ (3,500)	$ (3,600)
Financial Metrics				
Debt to Capitalization (GAAP)	55% - 60%			
FFO/Total Debt (Moody's)	Mid Teens			

* Common dividends increase to $0.67 per share in Q4 2018 for total dividends of $2.53/share; $2.68/share 2019 - 2021. Dividends evaluated by Board of Directors each quarter; stated target payout ratio range is 60-70%.

7.8% CAGR IN RATE BASE GROWTH

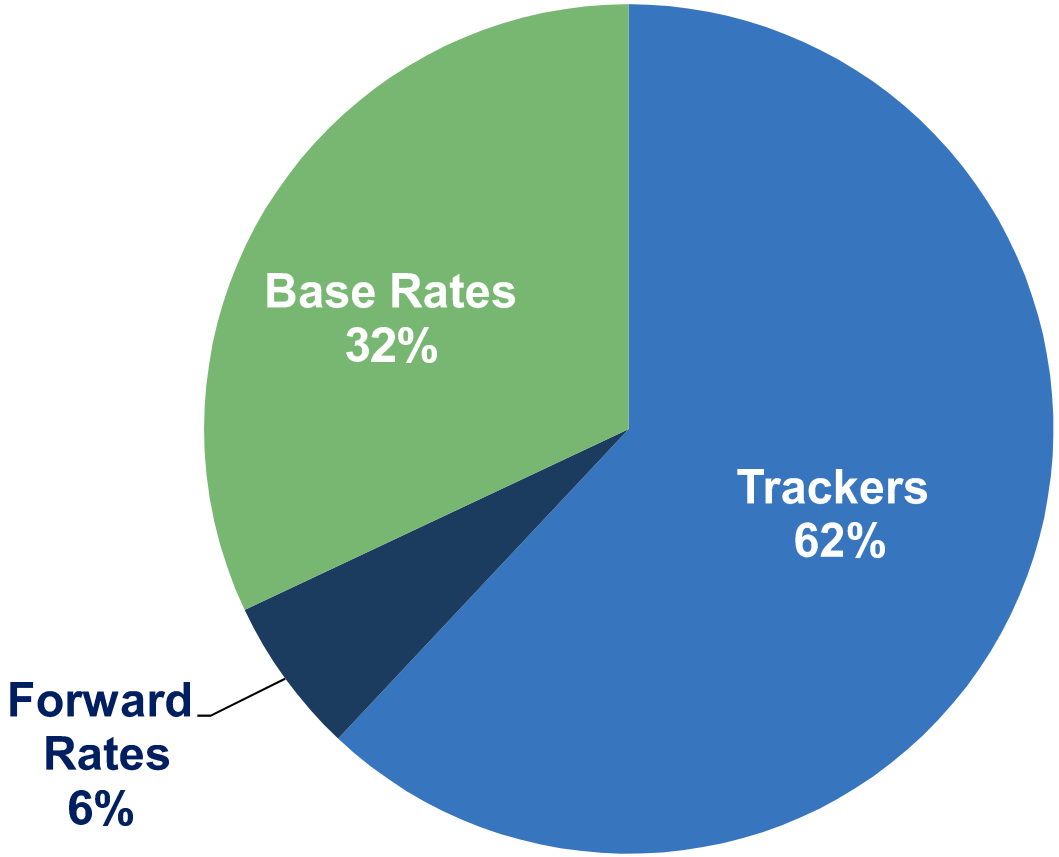
CUMULATIVE CHANGE FROM 2017 BASE

2017 Rate Base Proxy	
Vertically Integrated Utilities	$23.0B
T&D Utilities	$9.7B
Transcos/Transource	$5.7B
Total	**$38.4B**



5% - 7% EPS growth is predicated on regulated rate base growth

EFFICIENT COST RECOVERY MECHANISMS



Nearly 70% of 2019-2023 capital plan recovered through reduced lag mechanisms

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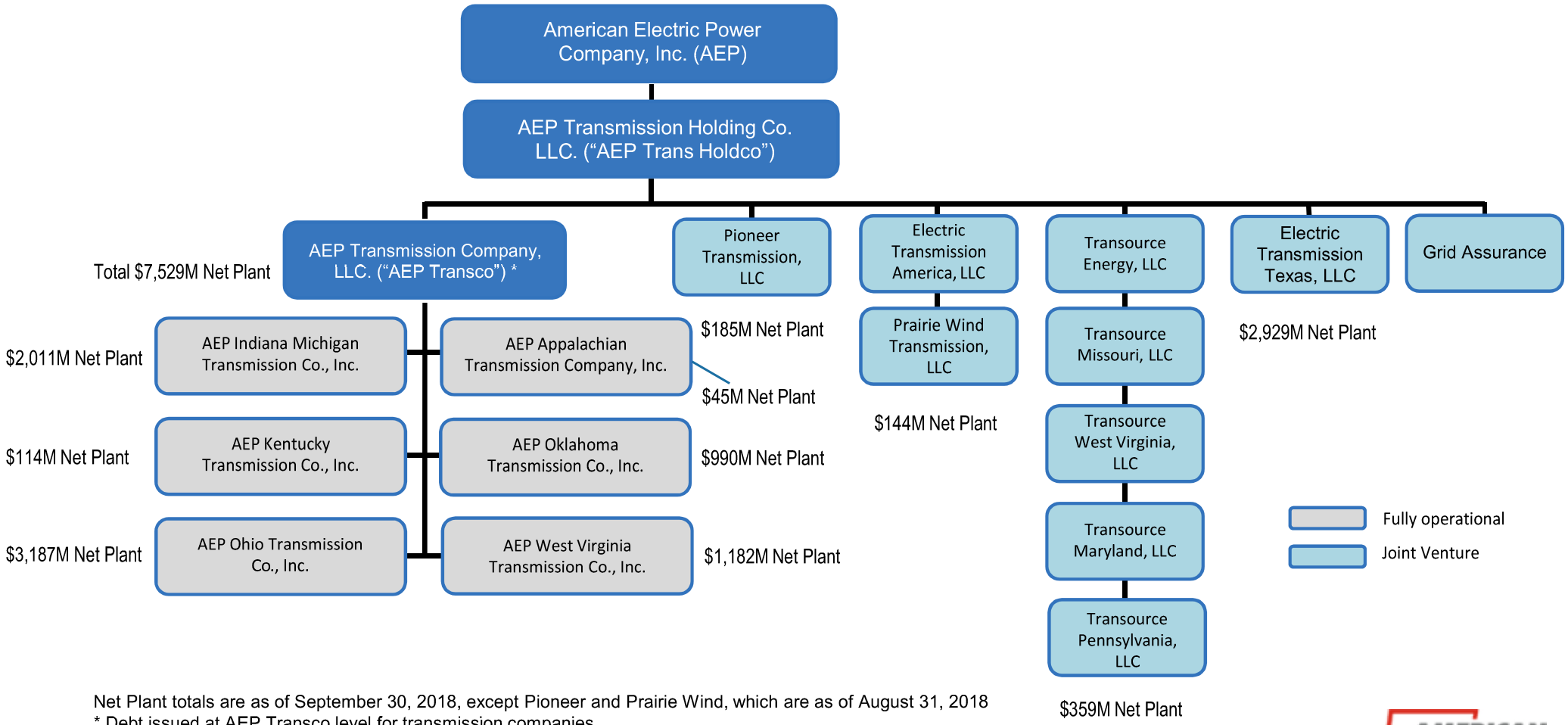
INVESTING IN TRANSMISSION

AEP TRANSMISSION HOLDCO LEGAL ENTITY STRUCTURE

AEP Transmission Company, LLC ("AEP Transco") is wholly-owned by AEP Transmission Holding Company, LLC ("AEP Trans Holdco")

AEP Trans Holdco is a wholly-owned subsidiary of American Electric Power Company, Inc. ("AEP"), one of the largest utility holding companies in the U.S.



Net Plant totals are as of September 30, 2018, except Pioneer and Prairie Wind, which are as of August 31, 2018

* Debt issued at AEP Transco level for transmission companies

TRANSMISSION PRIORITIES

Strategy	Execution	Results
Infrastructure Investment	Targeted Capital Investments Local Reliability, Telecom modernization, Asset Health	Improved Reliability/Resiliency Earnings Growth Efficient Cost Recovery
Customer Experience	Improve Reliability, SCADA technology, security across the transmission system, Economic Development	Modernize grid reducing equipment failures/outages, community impact, customer relations
Innovative Technologies/Solution	BOLD GRID ASSURANCE G&T Integrated Solutions Public Power Solutions	Industry Leadership Customer Solutions
Non-Traditional Growth	Pioneer TRANSMISSION Prairie Wind Transmission TRANSOURCE ETT Electric Transmission Texas	Investment & Customer Diversity

The nation's largest transmission services provider is focused on delivering its $3 billion annual capital plan to improve customer reliability and grid resiliency while meeting earnings growth targets through diversified investments.

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AEPTHC TARGET EARNINGS 2018-2021

Significant Investment
Over $13B projected by 2021 (AEP Transcos and the ownership percentage of Transource)

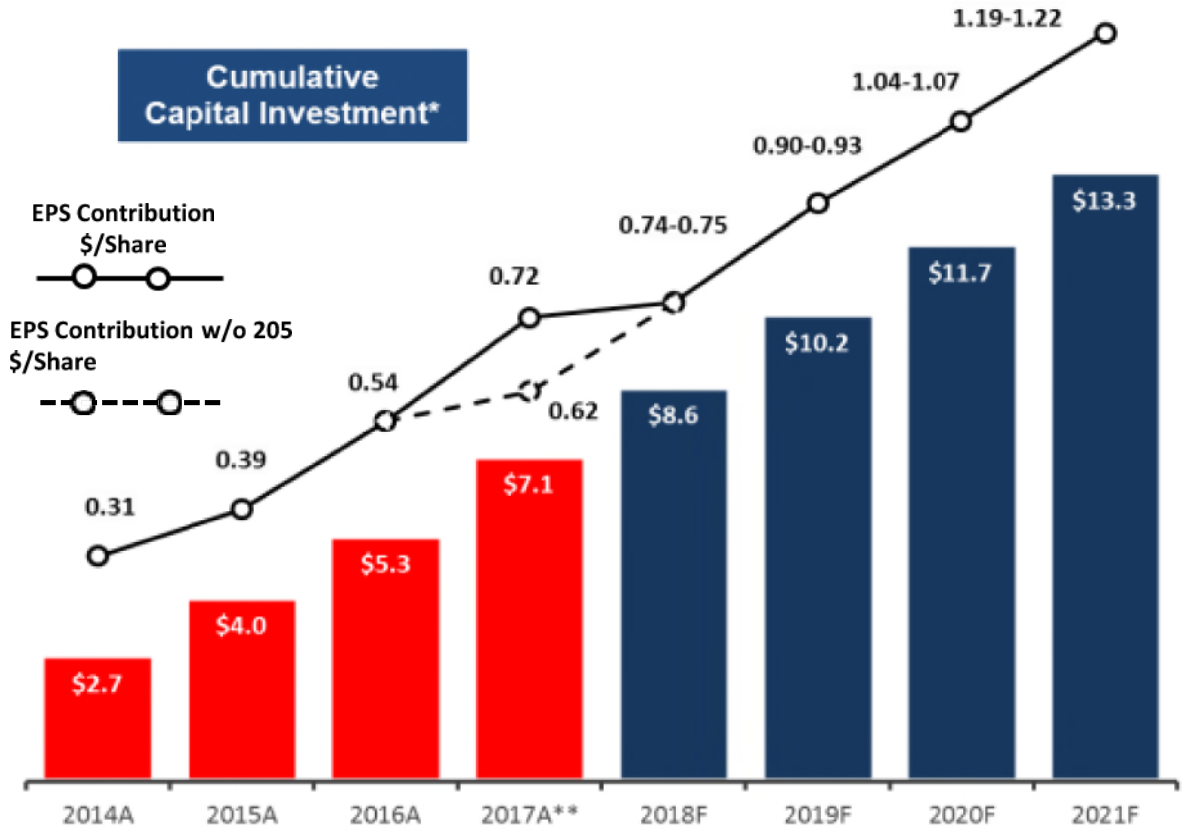
Healthy ROEs & Capital Structure
Affiliate authorized ROEs ranging from 9.6% to 12.8%

Authorized capital structure 40-60% equity

Portfolio Diversification
Five Transcos and ETT are projected to contribute 95% of total 2018 earnings (81% and 14% respectively)

Industry & Technology Leader
Bringing innovation and collaboration to the industry through Grid Assurance, BOLD and Asset Health

AEPTHC EPS contribution grows from $0.31 in 2014 to $1.19-$1.22 in 2021



AEPTHC's 2015 – 2021 EPS growth projected at a CAGR of 17.4%

* Capital investment excludes Transource unapproved projects, JV equity contributions, BOLD and Grid Assurance.
** In addition to forward looking rates, 2017 includes a historical true up for East Transcos. Having both in one year is a one time occurrence.

TRANSMISSION INVESTMENT DRIVERS

Key Transmission Investment Drivers	Typical 2018-2023 Project Examples
Local Reliability	• Flushing-Smyrna (OH) – construct 13 miles to alleviate thermal overload • Sheridan Project (WV) – 10M T outage minutes in last 3 years • Greenland-VBI North (OK) – replace 41 mile, 1938-vintage line • Roanoke Project (VA) – replace aging circuit breakers at 4 stations
Cyber and Physical Security	• Install physical security at critical Ohio EHV stations – $220M • Install physical security at critical ERCOT stations – $40M • Telecom Modernization – fiber expansion for increased security
Changing Supply Mix	• Alamo (TX) – connect 114MW solar farm • Cactus Flats (TX) – connect 150MW wind farm
Economic Projects	• Transource IEC Project (PA/MD) – reduce congestion costs by $620M over 15 years
Customer Interconnections	• Oklahoma – serve ~80MW increased load at gas plant • Columbus, OH – serve new data centers • Lotebush (TX) – new station for Permian Basin load growth
Regional Reliability	• La Palma Station (TX) – regional reliability to support peak demand • Thorofare Project (WV-Transource) – regional reliability • Jackson's Ferry 765kV SVC (VA) – high voltage during light load • Brackettville-Escondido (TX) – improve reliability in Eagle Pass
Grid Improvements	• SCADA Expansion (APCo) – $10M – SCADA in remote stations • Kenzie Creek – (MI) replace switches with breakers • Telecom Modernization Program – extend to additional stations

- **AEP's 15 state asset base serves as the foundation of the nation's electric system. FERC's support of transmission investments recognizes the critical function transmission plays in the power delivery system.**

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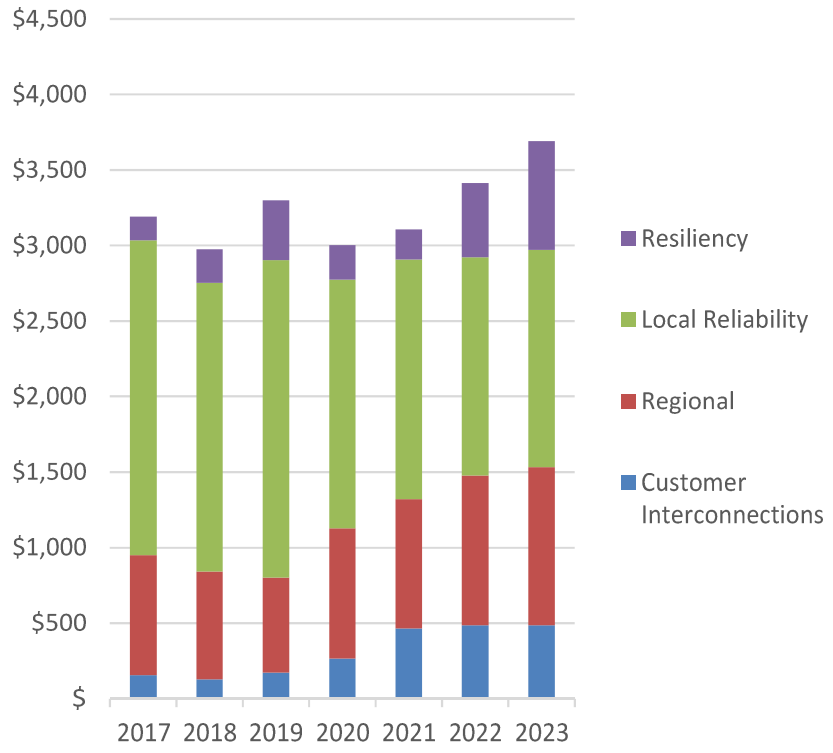
TRANSMISSION INVESTMENT CATEGORIES

As the foundation of the power system, transmission integrates generation and loads across large regional footprints.

- Growing complexity of the integrated power grid: Distributed generation, diversity in generation fleet, location and variability of generation
- System operations: Systems operating close to feasibility limits are more vulnerable (failures/intelligent adversaries)
- Survivability: Systems ability to survive contingencies without customer interruption

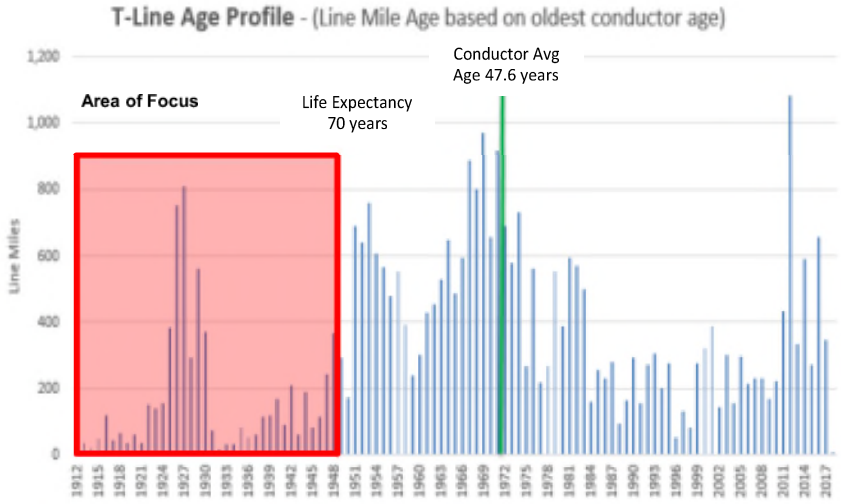
Major Issues Being Addressed

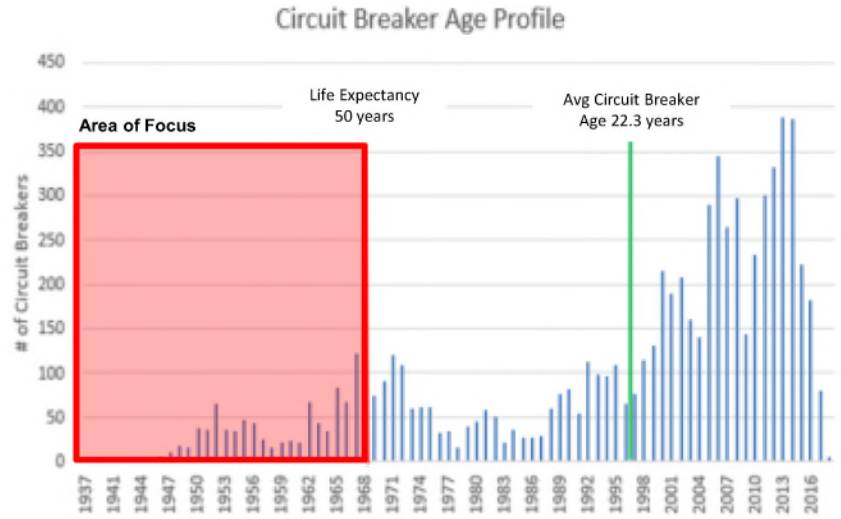
- Aging transmission facilities in poor condition
- Reduction of radial transmission sources
- NERC/RTO requirements
- Decrease customer exposure to transmission outages
- Improve response time
- Enhance operability of the system



2017-2023 Investment = $22.7 billion

ROBUST TRANSMISSION CAPITAL EXPENDITURE OPPORTUNITIES





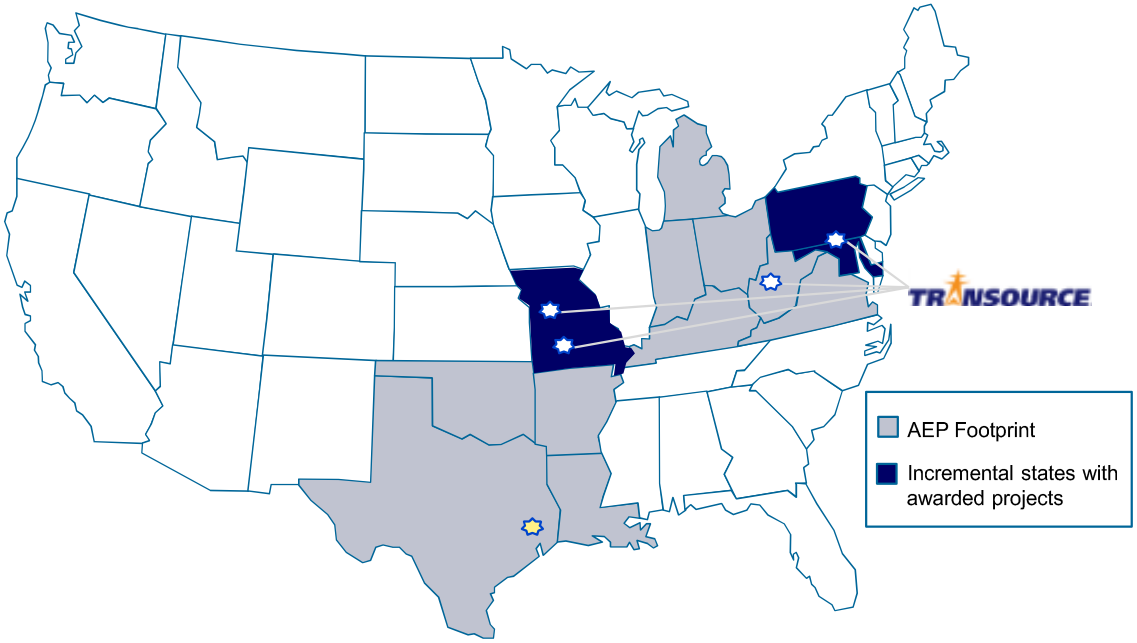
Transmission	Line Miles	Transformers	Circuit Breakers
Life Expectancy (years)	70	60	50
Current Quantity over Life Expectancy	6,085	234	998
Quantity that will exceed Life Expectancy in next ten years	5,057	133	653
Total Renewal Opportunity over ten years	11,142	367	1,651

$2.3 billion of annual investment, addresses the facilities past their estimated life expectancy; the asset age profile changes with actual investment

Scope and scale of AEP's Transmission network results in sustainable investment opportunity without risk of over-investment

TRANSOURCE ENERGY PROJECTS

- Transource is actively involved in pursuing projects in MISO, PJM and SPP competitive processes under FERC Order No. 1000
- In addition, Transource is positioned to further participate in new markets such as NYISO and CAISO as opportunities unfold



TRANSOURCE Missouri

- Two fully operational 345kV transmission line projects

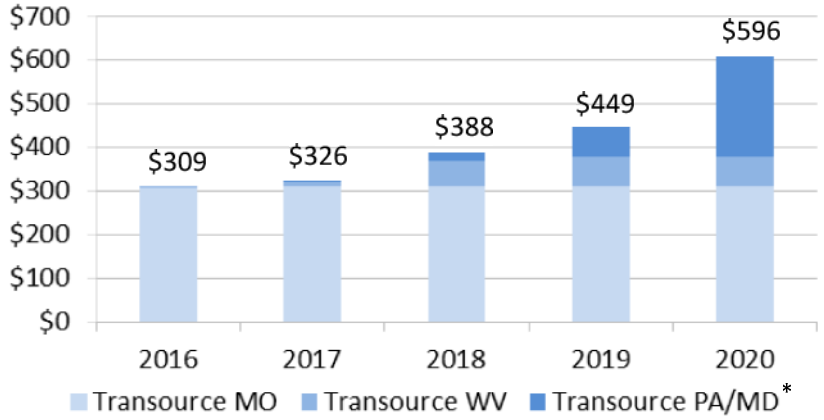
TRANSOURCE West Virginia

- New 138 kV line and two new substations currently under construction
- In-service by June 2019

TRANSOURCE Pennsylvania & Maryland

- Two new 230 kV lines and 500/230 kV substations
- Awarded in 2016; currently seeking state regulatory approvals in both states

Transource Energy Cumulative Capital Investment ($ in millions)



* Subject to state regulatory approvals

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TECHNOLOGY AND INNOVATION

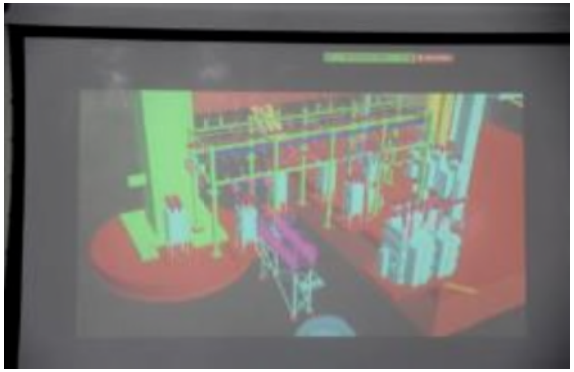
Drop in Control Module

Pre-Fabricated Bus/Station(PFBs)

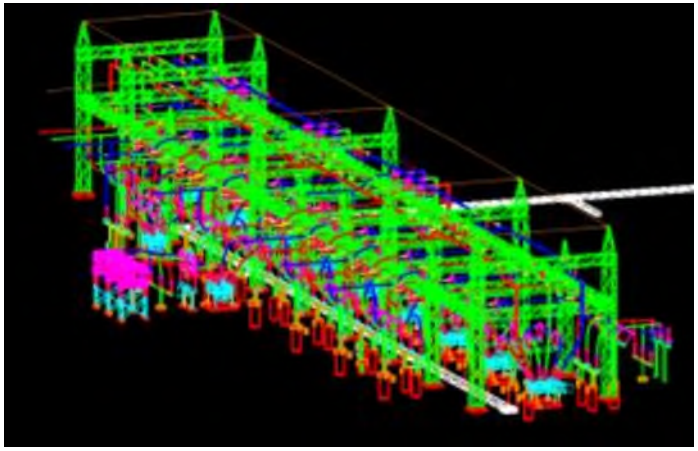
BOLD Transmission Line

Pre-fabricated Foundations (PFFs)

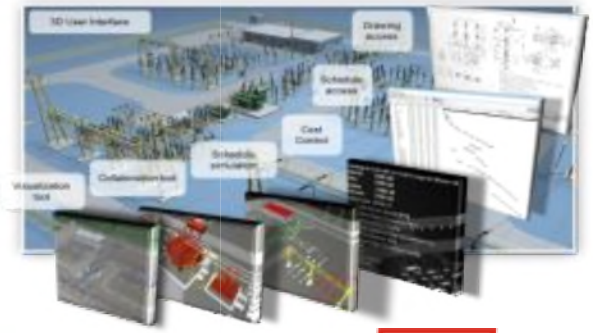
Fiber Optic Substations



Augmented/Virtual Reality



SMART 3D Design



Integrated Design
and Construction

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CUSTOMER LOAD GROWTH PROJECT

Tuscany 138 kV Station	
Project Description:	New 138 kV station to serve 40 MW facility in Circleville, Ohio. AEP is also building a similar substation in Inola, Oklahoma for the same customer with an April 2019 in service date.
Cost:	$7 million
In-service Date:	November 2017

AGING INFRASTRUCTURE PROJECT

Poston-Harrison 138 kV Line	
Project Description:	Retire and rebuild approximately 55 miles of 1954 vintage 138 kV system in Athens and Hocking County, Ohio.
Cost:	$62 million
In-service Date:	June 2019

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REGIONAL RELIABILITY PROJECT

La Palma 138 kV SVC	
Project Description:	Expand La Palma Station and install 2 Static Var Compensators (SVC) to support peak demand in Lower Rio Grande Valley.
Cost:	$50 million
In-service Date:	October 2018

LOCAL RELIABILITY PROJECT

Flushing-Smyrna Area Improvements	
Project Description:	Construct 13 miles of new 69 kV transmission line between Flushing and Smyrna Stations and rebuild Flushing Station in Eastern Ohio to alleviate thermal overload violation.
Cost:	$60 million
In-service Date:	December 2020

Summary: Testimony Direct Testimony of Kevin M. Murray on Behalf of Industrial Energy Users-Ohio (Part 3 of 4) electronically filed by Mr. Frank P Darr on behalf of Industrial Energy Users-Ohio